



EON Consulting

Busby Renewable Energy Plant: Draft Basic Assessment Report

16 June 2013

Draft 1

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Department:
Economic Development, Environment and Tourism
MPUMALANGA PROVINCIAL GOVERNMENT

Basic assessment report in terms of the Environmental Impact Assessment Regulations, 2010, promulgated in terms of the National Environmental Management Act, 1998(Act No. 107 of 1998), as amended.

File Reference Number:	(For applicant / EAP to complete) 17/2/3/GS-158
Project Title:	Busby Renewable Energy Plant
Name of Responsible Official:	Ms. Bulelwa Shabalala
NEAS Reference Number:	(For official use only)
Date Received:	

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3. An incomplete report may be returned to the applicant for revision.
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5. All reports (draft and final) must be submitted to the Department at the address of the relevant **DISTRICT OFFICE** given below or by delivery thereof to the relevant **DISTRICT OFFICE**. Should the reports not be submitted at the relevant district office, they will not be considered.
6. No faxed or e-mailed reports will be accepted.
7. One copy of the draft version of this report must be submitted to the relevant district office. The case officer may request more than one copy in certain circumstances.
8. **Copies of the draft report must be submitted to the relevant State Departments / Organs of State for comment.** In order to give effect to Regulation 56(7), proof of submission/delivery of the draft documents to the State Departments / Organs of State must be attached to the draft version of this report.
9. Unless protected by law, all information in the report will become public information on receipt by the competent authority. Any interested and affected party should be provided with the information contained in this report on request, during any stage of the application process.
9. All specialist reports must be appended to this document, and all specialists must complete a declaration of independence, which is obtainable from the Department.

DEPARTMENTAL DETAILS

HEAD OFFICE (18 Jones Street, Nelpruit)	EHLANZENI DISTRICT (50 Murray Street, Nelspruit)	NKANGALA DISTRICT (Pavilion Centre, Cnr Botha & Northey Streets, Witbank)	GERT SIBANDE DISTRICT (13 De Jager Street, Ermelo)
<p>Attention: Directorate: Environmental Impact Management Private Bag X 11215 Nelspruit, 1200</p> <p>Queries should be directed to the Directorate: Environmental Impact Management at: Tel: (013) 759 4000 Fax (013) 759 4165</p>	<p>Attention: Directorate: Environmental Impact Management Private Bag X 11215 Nelspruit, 1200</p> <p>Queries should be directed to the Directorate: Environmental Impact Management at: Tel: 0824068831 Fax: Email: nvmhdluli@mpg.gov.za</p>	<p>Attention: Directorate: Environmental Impact Management P. O. Box 7255 Witbank, 1035</p> <p>Queries should be directed to the Directorate: Environmental Impact Management at: Tel: 0136902595/6901358/076644170 7 Fax: Email:dtswai@wit.mpu.gov.za</p>	<p>Attention: Directorate: Environmental Impact Management P. O. Box 2777 Ermelo, 2351</p> <p>Queries should be directed to the Directorate: Environmental Impact Management at: Tel: 0178192828/9 0178114815 0798419582 Fax: E mail:stmarabane@mpg.gov.za</p>

Applications to be sent direct to district office

SECTION A: BACKGROUND INFORMATION

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Professional affiliations (if any):	IAIA		

SECTION B: DETAILED DESCRIPTION OF THE PROPOSED ACTIVITY

Describe the activity, which is being applied for, in detail. The description must include the size of the proposed activity (or in the case of linear activities, the length) and the size of the area that will be transformed by the activity.

The construction of a plant for the generation of electricity in 2 phases. The total capacity of the plant will have an output of 12.5 MW after completion of Phase 2. Phase 1 will generate 10 MW of electricity and will be below the 1 hectare thresholds specified in R544: Activity #1 as well as the "more than 10MW" threshold, but will exceed the threshold of activity #1 on completion of Phase 2.

Plantation and sawmill residue will be used as boiler fuel to generate renewable energy in the form of electricity. The electricity will be supplied to the National Grid. The plant will be erected on the existing footprint of the sawmill and the total extent of the proposed facility is less than 1 hectare.

SECTION C: PROPERTY/SITE DESCRIPTION

Provide a full description of the preferred site alternative (farm name and number, portion number, registration division, erf number etc.):

The locality of the proposed renewable energy plant is on the site of the existing Busby Sawmill, on the Farm Valschvlei 352 IT, Portion 5, Mpumalanga, in the district of Amsterdam. The location of the site is (26°48'51.40"S, 30°26'27.33"E).

No site alternatives are available, however alternative technologies have been considered.

Indicate the position of the activity using the latitude and longitude of the centre point of the preferred site alternative. The co-ordinates should be in degrees and decimal minutes. The minutes should have at least three decimals to ensure adequate accuracy. The projection that must be used in all cases is the WGS84 spheroid in a national or local projection. The position of alternative sites must be indicated in Section B of this document.

Latitude (S):		Longitude (E):	
26°	48'51.40"	30°	26'27.33"

In the case of linear activities: N/A

	Latitude (S):		Longitude (E):	
• Starting point of the activity	°	'	°	'
• Middle point of the activity	°	'	°	'
• End point of the activity	°	'	°	'

SITE OR ROUTE PLAN

A detailed site or route plan(s) must be prepared for each alternative site or alternative activity. It must be attached as an appendix to this document.

The site or route plans must be at least A3 and must include the following:

- 6.1 a reference no / layout plan no., date, and a legend / land use table
- 6.2 the scale of the plan which must be at least a scale of 1:2000;
- 6.3 the current land use as well as the land use zoning of each of the properties adjoining the site or sites;
- 6.4 the exact position of each element of the application as well as any other structures on the site;
- 6.5 the position of services, including electricity supply cables (indicate above or underground), water supply pipelines, boreholes, street lights, sewage pipelines, storm water infrastructure and telecommunication infrastructure;
- 6.6 all indigenous trees taller than 1.8 metres and all vegetation of conservation concern (protected, endemic and/or red data species);
- 6.8 servitudes indicating the purpose of the servitude;
- 6.9 sensitive environmental elements within 100 metres of the site or sites including (but not limited thereto):
 - watercourses and wetlands;
 - the 1:100 year flood line;
 - ridges;
 - cultural and historical features;
- 6.9 10 metre contour intervals

SITE PHOTOGRAPHS

Colour photographs from the centre of the site must be taken in at least the eight major compass directions with a description of each photograph. Photographs must be attached as an appendix to this form.

FACILITY ILLUSTRATION

A detailed illustration of the activity must be provided at a scale of 1:200 as an appendix for activities that include structures. The illustrations must be to scale and must represent a realistic image of the planned activity. The illustration must give a representative view of the activity.

SECTION D: BASIC ASSESSMENT REPORT (Attached to the application)

Prepare a basic assessment report that complies with Regulation 22 of the Environmental Impact Assessment Regulations, 2010. The basic assessment report must be attached to this form and must contain all the information that is necessary for the competent authority to consider the application and to reach a decision contemplated in Regulation 25, and must include:

1.	A description of the environment that may be affected by the proposed activity and the manner in which the geographical, physical, biological, social, economic and cultural aspects of the environment may be affected by the proposed activity.	
2.	An identification of all legislation and guidelines that have been considered in the preparation of the basic assessment report.	
3.	Details of the public participation process conducted in terms of Regulation 21(2)(a) in connection with the application, including – (i) the steps that were taken to notify potentially interested and affected parties of the proposed application; (ii) proof that notice boards, advertisements and notices notifying potentially interested and affected parties of the proposed application have been displayed, placed or given; (iii) a list of all persons, organisations and organs of state that were registered in terms of regulation 55 as interested and affected parties in relation to the application; and (iv) a summary of the issues raised by interested and affected parties, the date of receipt of and the response of the EAP to those issues;	
4.	A description of the need and desirability of the proposed activity;	
5.	A description of any identified alternatives to the proposed activity that are feasible and reasonable, including the advantages and disadvantages that the proposed activity or alternatives will have on the environment and on the community that may be affected by the activity;	
6.	A description and assessment of the significance of any environmental impacts, including— (i) cumulative impacts, that may occur as a result of the undertaking of the activity or identified alternatives or as a result of any construction, erection or decommissioning associated with the undertaking of the activity; (ii) the nature of the impact; (iii) the extent and duration of the impact; (iv) the probability of the impact occurring; (v) the degree to which the impact can be reversed; (vi) the degree to which the impact may cause irreplaceable loss of resources; and (vii) the degree to which the impact can be mitigated;	
7.	Any environmental management and mitigation measures proposed by the EAP;	
8.	Any inputs and recommendations made by specialists to the extent that may be necessary;	
9.	A draft environmental management programme containing the aspects contemplated in regulation 33;	
10.	A description of any assumptions, uncertainties and gaps in knowledge;	
11.	A reasoned opinion as to whether the activity should or should not be authorised, and if the opinion is that it should be authorised, any conditions that should be made in respect of that authorisation	
12.	Any representations, and comments received in connection with the application or the basic assessment report;	
13.	The minutes of any meetings held by the EAP with interested and affected parties and other role players which record the views of the participants;	
14.	Any responses by the EAP to those representations, comments and views;	
15.	Any specific information required by the competent authority; and	
16.	Any other matters required in terms of sections 24(4)(a) and (b) of the Act.	

The basic assessment report must take into account -

- (a) any relevant guidelines; and
(b) any departmental policies, environmental management instruments and other decision making instruments that have been developed or adopted by the competent authority in respect of the kind of activity which is the subject of the application.

* In terms of Regulation 22(4), the EAP managing the application must provide the competent authority with detailed, written proof of an investigation as required by section 24(4)(b)(i) of the Act and motivation if no reasonable or feasible alternatives, as contemplated in subregulation 22(2)(h), exist.

Have reasonable and feasible alternatives been identified, described and assessed?	YES	NO
If NO, the motivation and investigation required in terms of Regulation 22(4) must be attached as an Appendix to this document		

SECTION E: CONSULTATION WITH OTHER STATE DEPARTMENTS

Provide a list of all State Departments / Organs of State that have been consulted and registered as interested and affected parties, and to whom draft reports have been submitted for comment. **Proof of submission / delivery of the draft report to all State Department / Organs of State must be attached to this document.**

Department:	Department of Water Affairs		
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Department:			
Contact person:			
Postal address:			
Postal code:		Cell:	
Telephone:		Fax:	
E-mail:			

Department:			
Contact person:			
Postal address:			
Postal code:		Cell:	
Telephone:		Fax:	
E-mail:			

Department:			
Contact person:			
Postal address:			
Postal code:		Cell:	
Telephone:		Fax:	
E-mail:			

SECTION E: APPENDICES

The following appendices must be attached to the basic assessment report as appropriate:

Site plan(s)

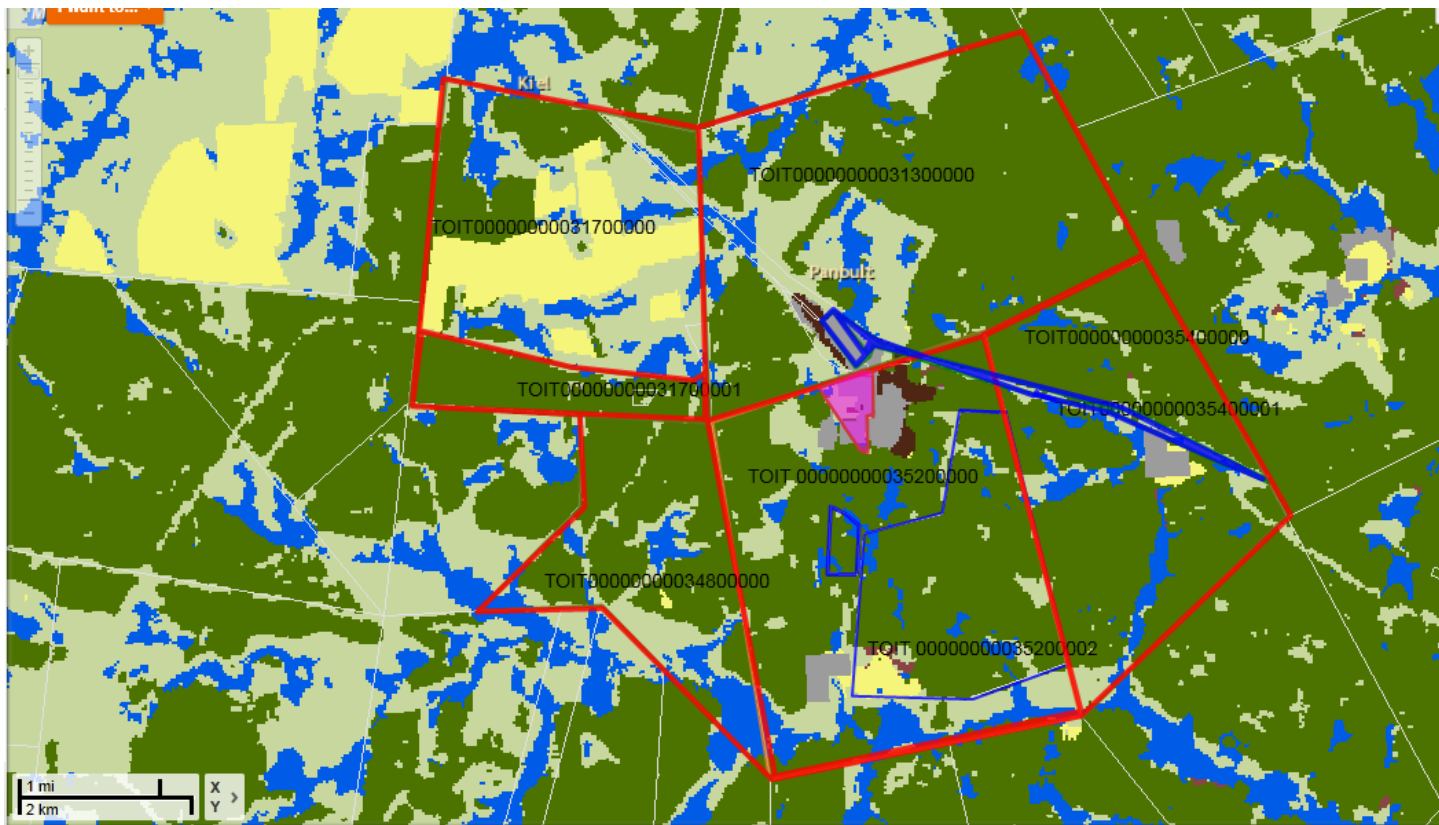
Photographs

Facility illustration(s)

Specialist reports

Comments and responses report

Other information



1. Executive Summary

The purpose of this document is to supply the Mpumalanga Department of Economic Development, Environment and Tourism (MPDEDET) with the requested information pertaining to the National Environmental Management Act (NEMA), as amended, and Regulation 22 of the Environmental Impact Assessment Regulations, 2010. Contained in this document is an overview of the proposed activity and site specific information of the proposed renewable energy project. The document contains an assessment of the impacts associated with the proposed activity, as well as an Environmental Management Plan for the mitigation of significant identified environmental impacts associated with the activity.

The proposed project is a joint venture between Farmsecure Energy (Pty) Ltd and J&J Timber Suppliers (Pty) Ltd, run in an SPV named Busby Renewables (Pty) Ltd. Farmsecure Energy is the majority shareholder who will develop, implement, operate and maintain the project. The proposed activity herewith applied for is for the construction of facilities for the generation of **12.5 MW of electricity**. The facilities will be erected on the existing footprint of the existing Busby Sawmill in the area of Amsterdam/Ermelo. The total footprint of the proposed development is below 1 hectare.

The project will be developed in two phases. During Phase 1, facilities will be constructed to generate less than 10 MW of power. The facilities will be expanded in Phase 2 to generate 12.5 MW of electricity, by the addition of an additional boiler, turbine and generator capacity.

The proposed project will be located at the site of an existing sawmill (Busby Sawmill). Facilities related to the generation of electricity will be constructed. Sawmill and plantation residue will be used as biofuel to generate electricity for the national grid. The selected technology for the Busby Renewables Energy Plant is a conventional steam Rankine cycle. The energy from direct combustion of biomass is carried over to hot water in a pressurised boiler system. Electricity is generated by a turbine at a pre-defined voltage supplied to an existing grid and distribution network.

A Basic Assessment is required for the proposed construction of facilities for the construction of a renewable energy plant. The following listed activity is triggered by the proposed development: Listing Notice (LN) 1: Activity # 56, with reference to Government Notice (GN) No. R. 544 of 18 June 2010.

The phased activities referred to in Activity # 56 as referred to above are with reference to Activity #1 of the same Regulations, namely:

- (1) The construction of facilities or infrastructure for the generation of electricity where:
 - i. the electricity output is more than 10 megawatts but less than 20 megawatts.

An application was submitted to DEDET with respect to the above. The application was accepted and the following Reference Number provided: 17/2/3 GS-158.

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DEFINITIONS

Environment: The surroundings (biophysical, social and economic) within which humans exist and that are made up of:

- i. the land, water and atmosphere of the earth
- ii. microorganisms, plant and animal life
- iii. any part or combination of (i) and (ii) and the interrelationships among and between them
- iv. the physical, chemical, aesthetic and cultural properties and conditions of the foregoing that influence human health and wellbeing.

Environmental Aspects: Elements of an organisation's activities, products or services that can interact with the environment.

Environmental Degradation: Refers to pollution, disturbance, resource depletion, loss of biodiversity, and other kinds of environmental damage which may be the result of accidental or intentional human activities.

Environmental Impacts: Any change to the environment, whether adverse or beneficial, wholly or partially resulting from an organization's activities, products or services.

ABBREVIATIONS

BAR	Basic Assessment Report
BID	Background Information Document
CEDI	Continuous Electro de-ionisation
CDM	Clean Development Mechanism
CDM	Carbon Development Mechanism (Kyoto Principal)
CRR	Comments and Response Report
DEA	Department of Environmental Affairs
DWA	Department of Water Affairs
EAP	Environmental Assessment Practitioner
EIA	Environmental Impact Assessment
EMP	Environmental Management Programme
ESP	Electrostatic precipitator
GN	Government Notice
HDI	Human Development Index
HRSG	Heat recovery steam generation
I&AP	Interested and Affected Party
IDP	Integrated Development Plan
MPDEDET	Mpumalanga Department of Economic Development, Environment and Tourism, Mpumalanga
MEGDP	Mpumalanga Economic Growth and Development Path
NEMA	National Environmental Management Act, Act 107 of 1998 as amended
NEMWA	National Environmental Management Act: Waste Management Act
PM	Particulate Mater
PPP	Public Participation Process
R	Regulation
SANBI	South African National Biodiversity Institute
SPV	Special Purpose Vehicle

2. Project Details

Reference No.: 17/2/3/GS-158 Mpumalanga Department of Economic Development, Environment and Tourism (MPDEDET)

Project Title: Busby Renewable Energy Plant situated on the Farm Valschvlei 352 IT, Portion 5, Mpumalanga

Applicant: Busby Renewables (Pty) Ltd.

Compiled by: EON Consulting, Adri Venter

Date: 16 June 2013

3. Introduction

3.1. Applicant

Project applicant:	Farmsecure Energy and J&J Timber Suppliers (Pty) Ltd trading as Busby Sawmills		
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3.2. Appointed Environmental Assessment Practitioner

Environmental Assessment Practitioner (EAP):	EON Consulting		
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Qualifications & relevant experience	MSc (Geography and Environmental Studies), 10 years		
Professional affiliation	IAIA		

3.3. Proposed Locality

The locality of the proposed renewable energy plant is on the site of the existing Busby Sawmill, on the Farm Valschvlei 352 IT, Portion 5, Mpumalanga, in the district of Amsterdam.

The map below provides an indication of the location of the site (26°48'51.40"S, 30°26'27.33"E).

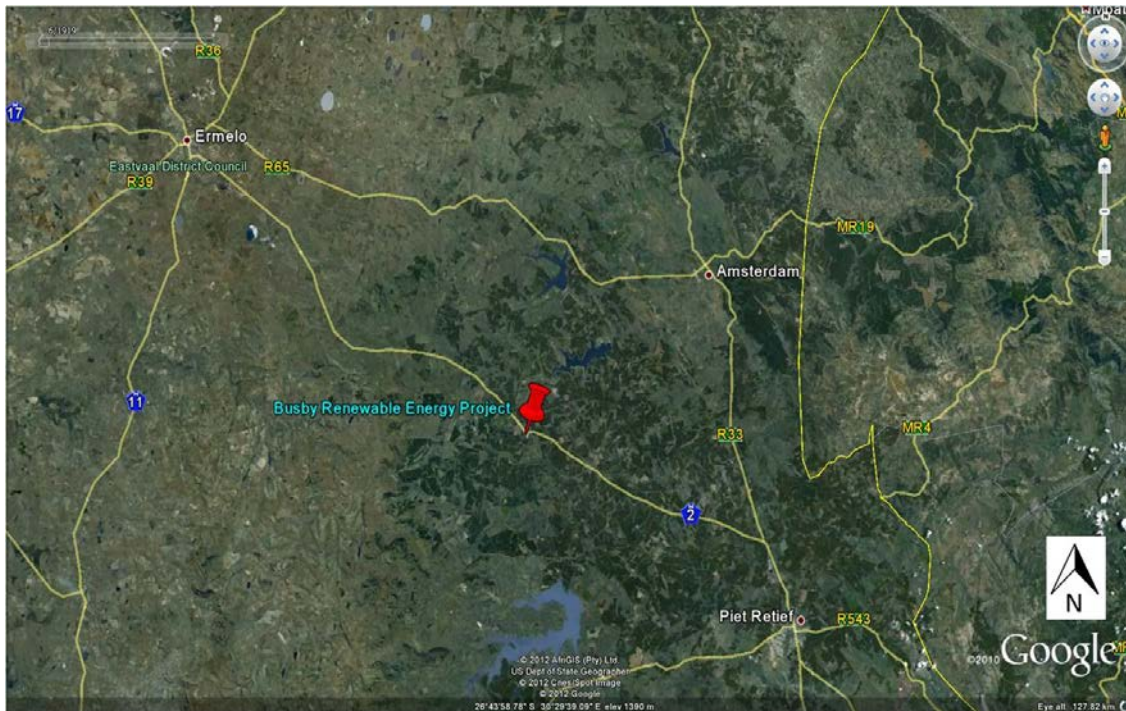


Figure 1: The location of the Busby Renewable Energy Plant

3.4. Activities Applied for the Purposes of an Environmental Authorisation

Applicable legislation	Listed Activity Number	Activity detail
R544 of 18 June 2012	56 (with reference to Activity # 1)	<p>The construction of a plant for the generation of electricity in 2 phases. The total capacity of the plant will have an output of 12.5 MW after completion of Phase 2. Phase 1 will generate 10 MW of electricity and will be below the 1 hectare thresholds specified in R544: Activity #1 as well as the “more than 10MW” threshold, but will exceed the threshold of activity #1 on completion of Phase 2.</p> <p>Plantation and sawmill residue will be used as boiler fuel to generate renewable energy in the form of electricity. The electricity will be supplied to the National Grid. The plant will be erected on the existing footprint of the sawmill and the total extent of the proposed facility is less than 1 hectare.</p>

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Communication with the National Department of Environmental Affairs (DEA) with respect to clarification on listed activities confirmed the following:

- a) That the boiler ash in this context is not considered as waste but as a by-product (with reference to the definition in the National Environmental Management Act: Waste Management Act (NEMWA) (Act 59 of 2008)
- b) That the sawmill and plantation biomass in this context are not considered as a waste under the above Act, but as a by-product
- c) That in terms of the National Environmental Management: Air Quality Act, 2004 (Act 39 of 2004), the heat-output of this installation for the combustion of biomass falls below the thresholds of the Act, and that it is not considered as a listed activity.

A copy of the communication letter in this regard to the DEA, as well as the response received from the DEA, has been appended to this document.

3.5. Current Situation

The Sawmill has been operational on the site since 1965 and is currently owned by Busby Sawmills. The sawmill processes logs from local plantations into timber ready for further processing into a variety of products by other manufacturers. Water for the site is obtained from three boreholes, located on a servitude adjacent to the site. A registration certificate for this water use has been issued by the Department of Water Affairs. The Sawmill currently uses 52 m³ of water per day (a combination of domestic and industrial use). A boiler is currently operational on site, which will be decommissioned and demolished to make way for the new boiler that will be erected on the site for the purpose of electricity generation. The boiler feed material will consist of plantation offcuts as well as sawmill residue. Electricity that will be generated will be supplied to the national electricity distribution grid.

3.6. Description of the Proposed Activity

The project will be developed in two phases:

Phase 1: Facilities will be constructed to generate 10 MW of electricity (the captive power used by the plant is 1.19 MW and the output from the plant to the grid is 8.81 MW). The plant will also supply 8 tons of steam/hour to the sawmill. The total footprint of the activity will be less than 1 hectare. Electricity will be supplied to the national grid via an existing electricity distribution network.

Phase 2: During Phase 2 of the project, the facility will be expanded to increase the installed capacity of the power generation plant to 12.5 MW (the captive power used by the plant will be 1.4 MW and the output of the plant to the grid will be expanded to 11.1 MW). The footprint of the activity will remain less than 1 hectare. The Phase 1 boiler will be expanded to allow for a larger volume as well as increased heat transfer area to supply the turbine steam demand. The steam drum size will be increased to store the required amounts. To utilize the increased steam production, a second turbine and generator will be installed in parallel.

The technology planned for the Busby Renewable Energy Plant is a conventional steam Rankine cycle. The energy from direct combustion of biomass (sawmill and plantation residue) is carried over to hot water in a pressurised boiler system. The water undergoes a phase change in an evaporator and superheated. The superheated steam is expanded through a turbine where pressure and volume change is converted to shaft work. The shaft work generates electricity at a pre-defined voltage supplied to an existing grid and distribution network.

3.6.1. Power Generation Description

The power generation facility can be divided into the following main sections:

- *Biomass conditioning, storage and feed:*

The plantation waste will be chipped and stockpiled in combination with the wood chips, sawdust and off-cuts from the Sawmill. The biomass quality, moisture content and calorific value will vary with seasonal and diurnal changes. To minimize the impact of external factors, biomass will be:

- Reclaimed from stockpile and fed from different feed hoppers into the combustion plant
- Waste heat from the flue gas will be used to pre-dry the biomass from 30% moisture (on average) to 10-13% moisture content.

- *Combustion:*

The biomass is converted to thermal energy through direct combustion in a furnace. The proposed combustion technology is a moving grate system that ensures sufficient residence time for complete conversion and introduces air at different temperature and locations through the grate.

Air will be pre-heated by the flue gas after heat recovery steam generation and used for combustion and partially for drying the fuel. The air to fuel ratio will be adapted according to the specific moisture content and biomass quality.

- *Heat recovery steam generation (HRSG):*

The thermal energy in the hot flue gas is carried over to hot water in a pressurised boiler system. The boiler feed water is treated to maintain the levels of dissolved solids and composition according to the boiler pressure and design specifications. Feed water will be de-aerated with bleed steam from the turbine/boiler blow down to control the level of dissolved oxygen. Flue gas after the steam generator is used to heat the boiler feed water in an economizer to maximize energy recovery. The water is then evaporated and superheated at low, medium and high pressure.

● *Electricity generation:*

Superheated steam from the HRSG unit is expanded in a turbine and the pressure and volume change is converted to shaft work. The selected turbine technology is of the full condensing type. The condensing turbine is a technology preferred for power generation maximise electrical output.

Process steam, currently used in the drying process of timber, will be supplied at a rate of 8 ton/h and pressure of 6 Bar (g). The method of steam supply will be blow-down from the boiler drum. The process steam will be condensed and recovered back as boiler feed water to the HRSG unit. The steam used completely for power generation will be condensed in a vacuum condenser to maximise electricity production. The cooling method will be dry cooling and heat dissipated with air coolers, condenser temperature approaching the air dry bulb temperature.

● *Flue Gas treatment:*

The fly ash collector for the flue gas adopts an electrostatic precipitator (ESP). The flue gas accesses the ESP via the inlet hoods. The inlet hoods are equipped with gas distribution screens, made of perforated plates that are provided with mechanical rapping devices. The ESP casing is equipped with discharge electrodes (DE) and collecting electrodes (CE) which are arranged in parallel, thus forming gas passage. The DE is connected to the negative pole of a HV set. The collecting electrodes are positively poled and earthed. Due to the high field strength in the ambience of the DE they produce a corona- discharge whereby the gas is ionized. The gas ions adhere to the dust particles. Due to the influence of the electrical field the charged dust particles migrate to the CE forming a dust layer. Accumulated particulate matter is removed from the collection plates at the periodic intervals by rapping or hitting the plates with rappers. Heavy particles will fall to the base of the ESP system. The ESP has the following characteristics:

- Low pressure loss
- High efficiency of ash collecting > 99%
- Resistance to high temperature, about 3000°C
- Low cost of maintenance

● *Water supply and water treatment:*

Fresh water will be supplied to the plant from boreholes. The applicant is in the process of applying for a water use license for the abstraction of ground water. The total water demand for the new plant will be 120m³ per day.

Raw water will be abstracted from Borehole Nr 3 (Figure 2). The water will be pumped to the plant via a 50mm PVC underground pipeline where it will be dosed with 0.3 mg/l free chlorine to eliminate any bioactivity, prior to entering a 1 Ml holding tank on site.

From the holding tank 6.25m³/h water will go through an ultrafiltration system. Of this 2.25 will be available for domestic use and 4 m³/h will be sent to an and demineralisation plant, of this:

- 1 m³/h will be available for power plant utilities (turbine, de-aerator, boiler grate)
- 1 m³/h will be used to supplement the process steam losses from the drying kilns
- 1 m³/h will be used to supplement boiler blowdown losses
- 1 m³/h will be utilised for ash quenching (irrigation quality effluent).

The proposed demineralisation system for the Busby Renewable Energy Plant is based on a reverse osmosis system followed by a Continuous Electro de-ionisation (CEDI) system. This system produces an effluent stream (1 m³/h) with an electrical conductivity (EC) around 100 mS/m, suitable for irrigation. This effluent stream will be used for ash quenching, basically making this a Zero Liquid Discharge plant.

It is anticipated that the membrane skid will require a cleaning treatment at a frequency of once every 2 months. A normal chemical cleaning sequence will have a typical duration of approximately 6 to 12 hours. The chemical cleaning system is a Cleaning-In-Place system, which means that the membrane modules do not have to be dismantled to be cleaned. Effluent water will be generated during the cleaning sequence. It is expected that the cleaning will generate 2 m³ of acetic and basic solution every 2 months. This effluent will be stored on site in containers and removed by a reputable waste removal company to a licensed landfill site, before the total volume reach 35 m³.

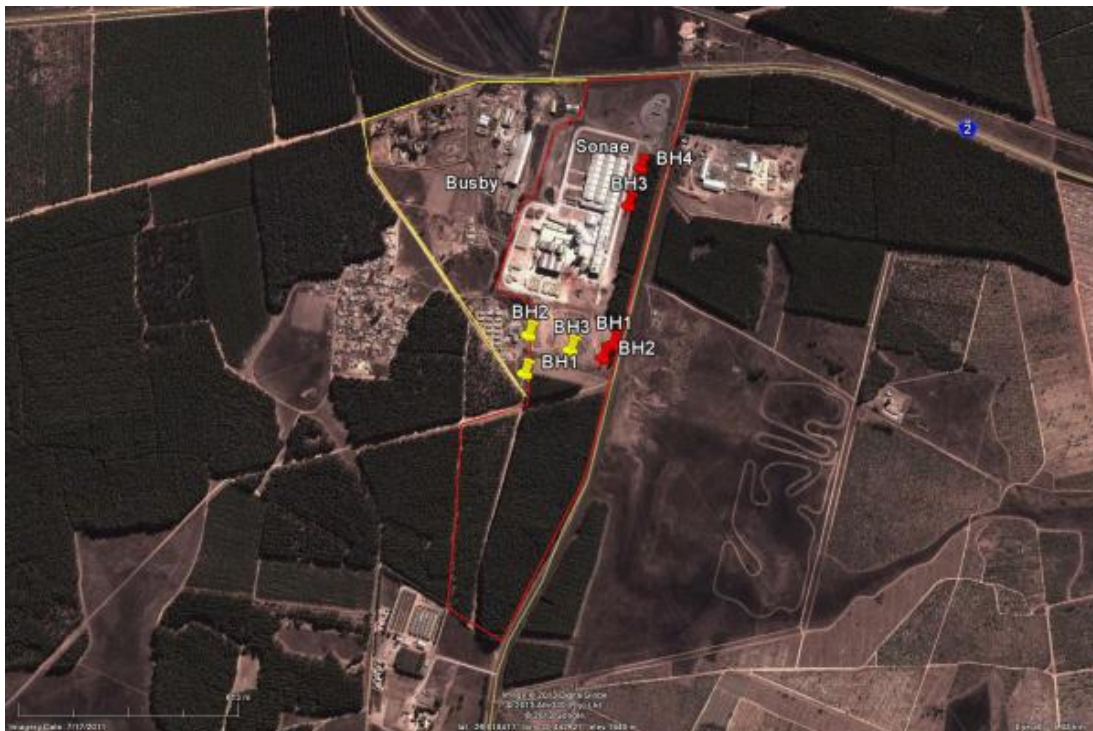


Figure 2: The boreholes (indicated by the yellow pins) from which ground water will be abstracted

● *Boiler Ash:*

Boiler ash from biomass represents a rich source of plant nutrients and will be returned to the surrounding plantation during the planting of tree seedlings. (Please refer to the Annexures for the decision of DEA regarding the land application of boiler ash). Boiler ash, on removal from the boiler, will be quenched with boiler blow-down water and effluent stream from demineralization plant (to maximize the re-use and recycling of the available water). It is expected that most of the water will evaporate during the process of quenching. Ash will be

stored in hoppers on site before removal to a central storage facility (associated with existing forestry operations) for the purposes of land application as fertilizer

3.6.2. Biomass Description

The plant will utilise the following biomass as a fuel source:

- *Plantation residues from forestry operations*

The main renewable biomass source for the project is plantation residues (wood from the trees) generated from forestry operations during harvesting, thinning and pruning operations of trees. In the baseline situation, these residues are left to decay after harvesting or burnt in order to prevent fires in new or existing forest plantations. It is the utilisation of this material, as well as the Sawmill residue below, for the generation of renewable energy that allows the proposed project to be registered as a project under the Clean Development Mechanism (CDM).

- *Sawmill residues from the Sawmill operations*

Sawmill residues from the Sawmill operations, consisting of waste wood chips and sawdust as well as off-cuts from the Sawmill, will also be utilized by the project in small quantities. Currently this biomass source is burnt in low pressure steam boilers to generate steam in the drying kilns.

3.6.3. Exporting Electricity to the National Grid

Electricity will be transferred to the national grid by means of transmission infrastructure. The capacity of the transmission lines is below 33 kilovolts and the lines will join up with the national grid on the facility boundary.

3.6.4. Supporting Infrastructure

Infrastructure and services supporting the electricity generation facility will be the same as those for the existing sawmill – these include existing access roads, parking, ablution facilities, office facilities and removal of office waste.

3.7. Design of the Proposed Facility

Figures 3, 4 and 5 below provide an overview of the different processes associated with the renewable energy plant.

- a) Biomass feed (green blocks, Figure 3) is via a screen, chipper and dryer to the furnace feed and then to the ash hopper. Ash is quenched with water, and then stored until it is applied to land as fertilizer.
- b) Water Cycle (blue blocks, Figure 4): water is abstracted from the borehole, treated and sent to the boiler. Steam is de-aerated and condensed, then cooled and returned to the boiler. After 7 cycles, water is replaced with fresh water, due to the build-up of salts which can corrode the boiler system over the longer term. This water, of which the water quality corresponds to the natural water quality abstracted from the borehole, is used for ash quenching. In contact with the hot ash, most of the water evaporates.

- c) Electricity Cycle (grey blocks, Figure 4): Electricity is generated by steam pressure that drives a turbine. The turbine causes a magnetic field in a generator which then generates electricity which is distributed via the distribution lines.
- d) The stack emission cycle (orange blocks, Figure 5): Fly-ash is collected via an electrostatic precipitator (ESP) before flue gasses are released to the atmosphere via the stack. Fly-ash will be disposed of to an appropriately licenced landfill site.

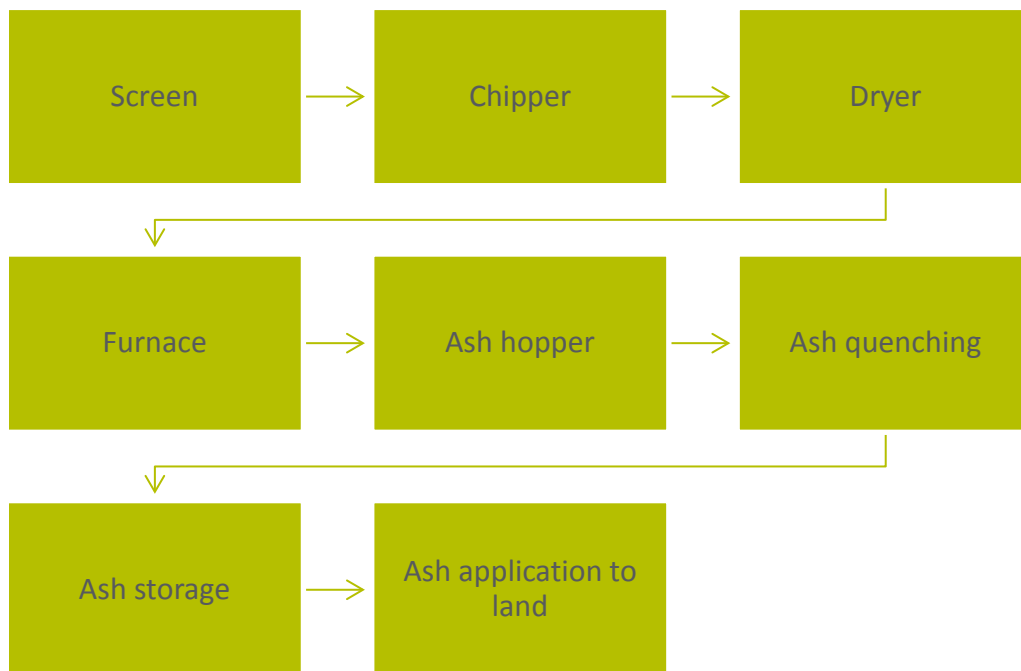


Figure 3: The biomass cycle

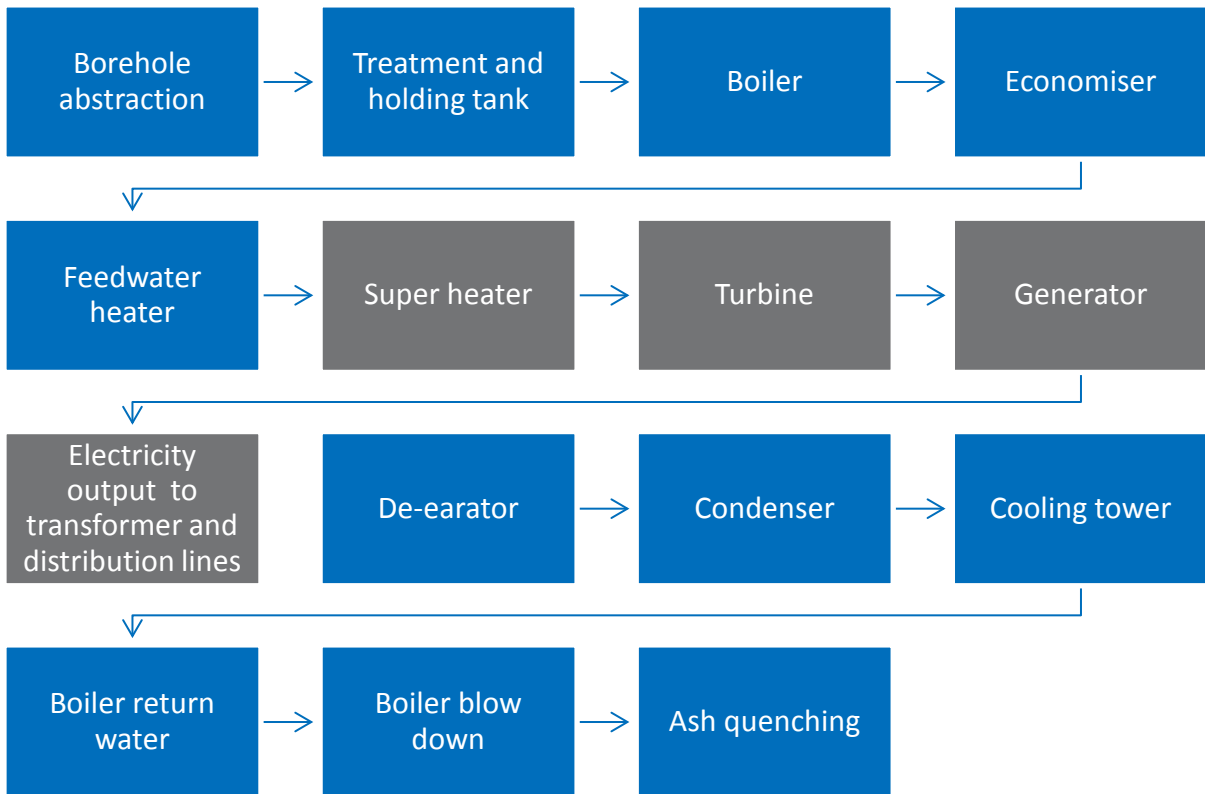


Figure 4: The water (blue blocks) and electricity (grey blocks) process

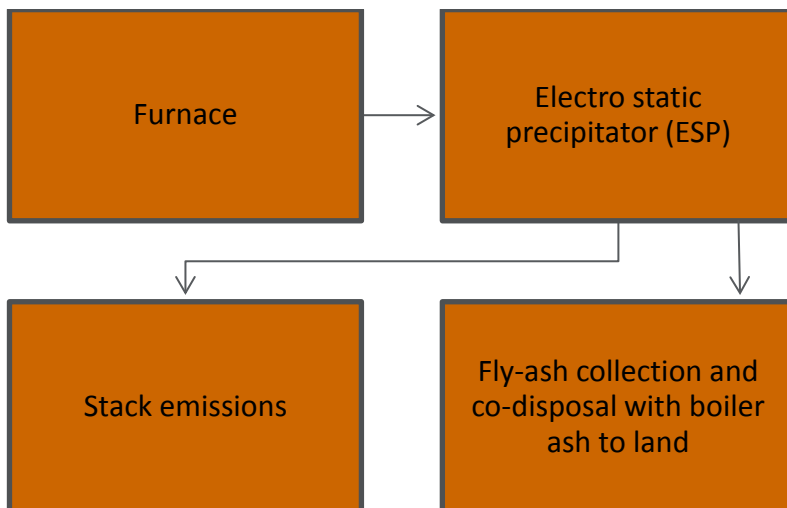


Figure 5: The stack emission cycle

The full project cycle is provided in the flow diagram below.

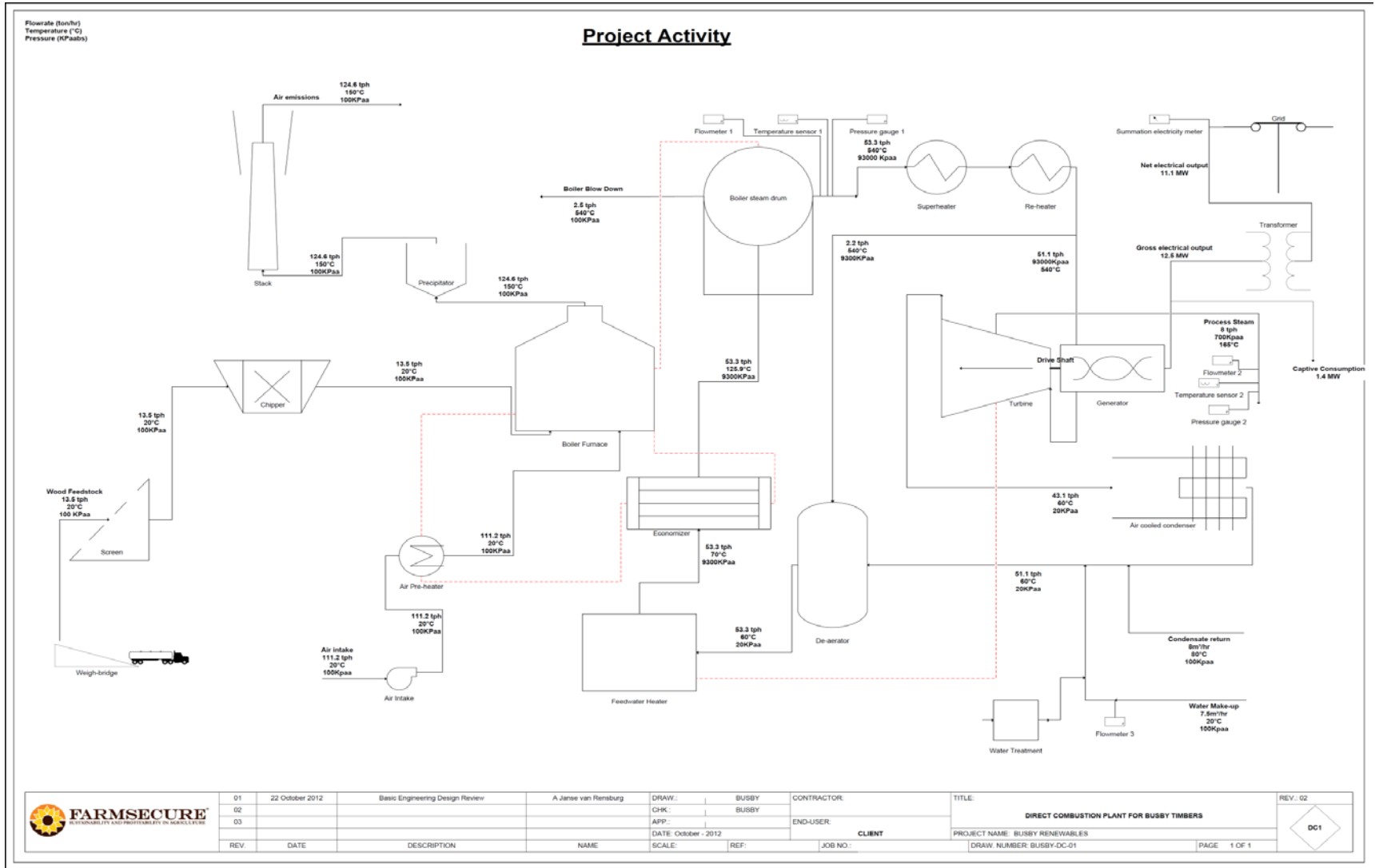


Figure 6: Process flow diagram

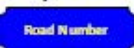
4. A Description of the Environment that May Be Affected by the Proposed Activity

4.1. Geographical

The map below provides an overview of the immediate location of the proposed project. As can be seen, the different land-uses in the area are mainly associated with industrial use, road and railway networks as well as plantations. Informal residential use occurs approximately 200 meters from the nearest point of the property boundary.



Legend:



The Land Cover map below (obtained from BGIS, SANBI) indicates the land uses associated with the whole of the farm Valschvlei (of which the relevant Portion has been indicated by the red square). The land classes associated with the project area is “Urban Built-up”.

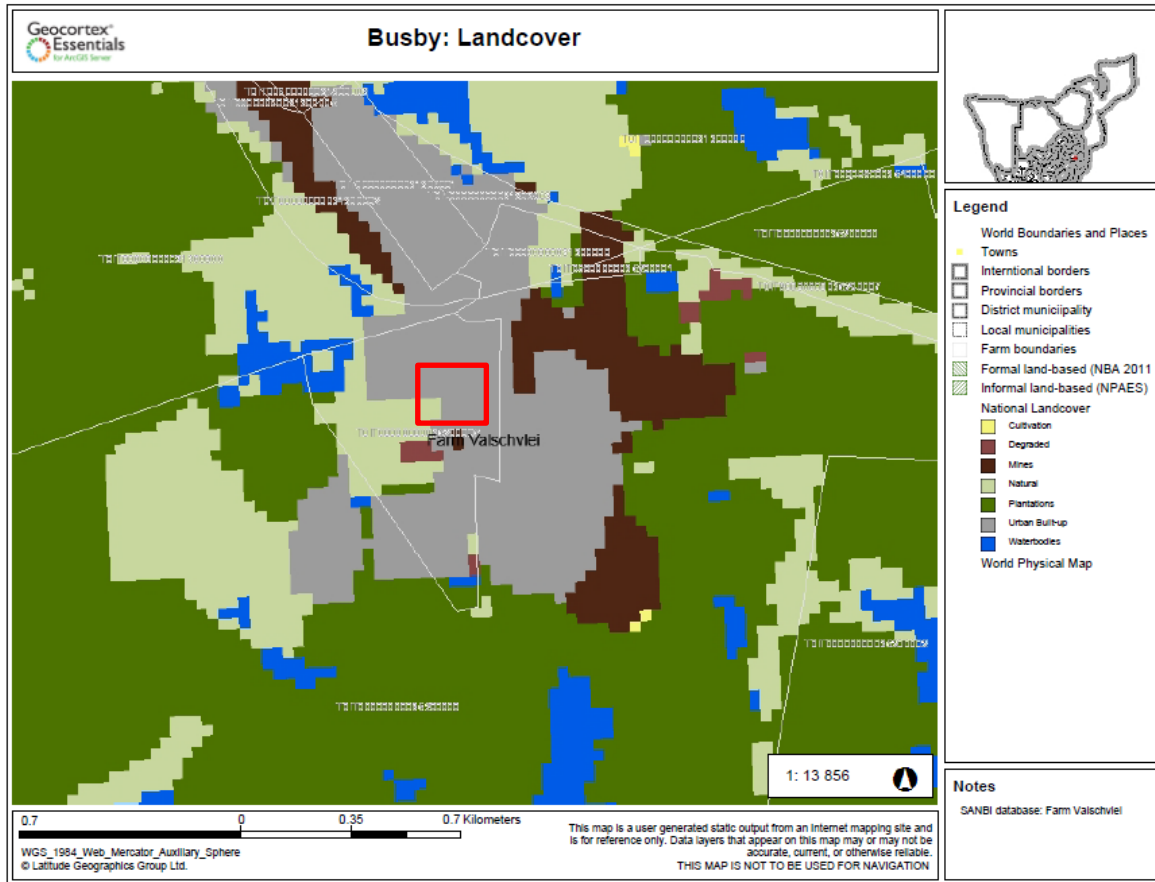


Figure 7: Land cover classes associated with the region (Data from SANBI)



Figure 8: An overview of the site (with the existing boiler house to the right)



Figure 9: The old boiler house, which will be demolished.



Figure 10: The existing electricity connection on the site, which will be used as the connection point for the generated electricity

4.2. Physical

Relief on Busby varies from 1455 to 1437 mamsl, with the highest point being along the N2 highway, falling away gently to the north, north of the N2, and to the south east, south of the N2. The slope is less than 2%. The property is surrounded by forestry plantation. The site falls within catchment W52B. A wetland exists about 1000 m to the north but is located in the adjacent catchment W53A and not hydrologically connected to W52B. The Figure below illustrates the contours associated with the Farm Valschvlei.

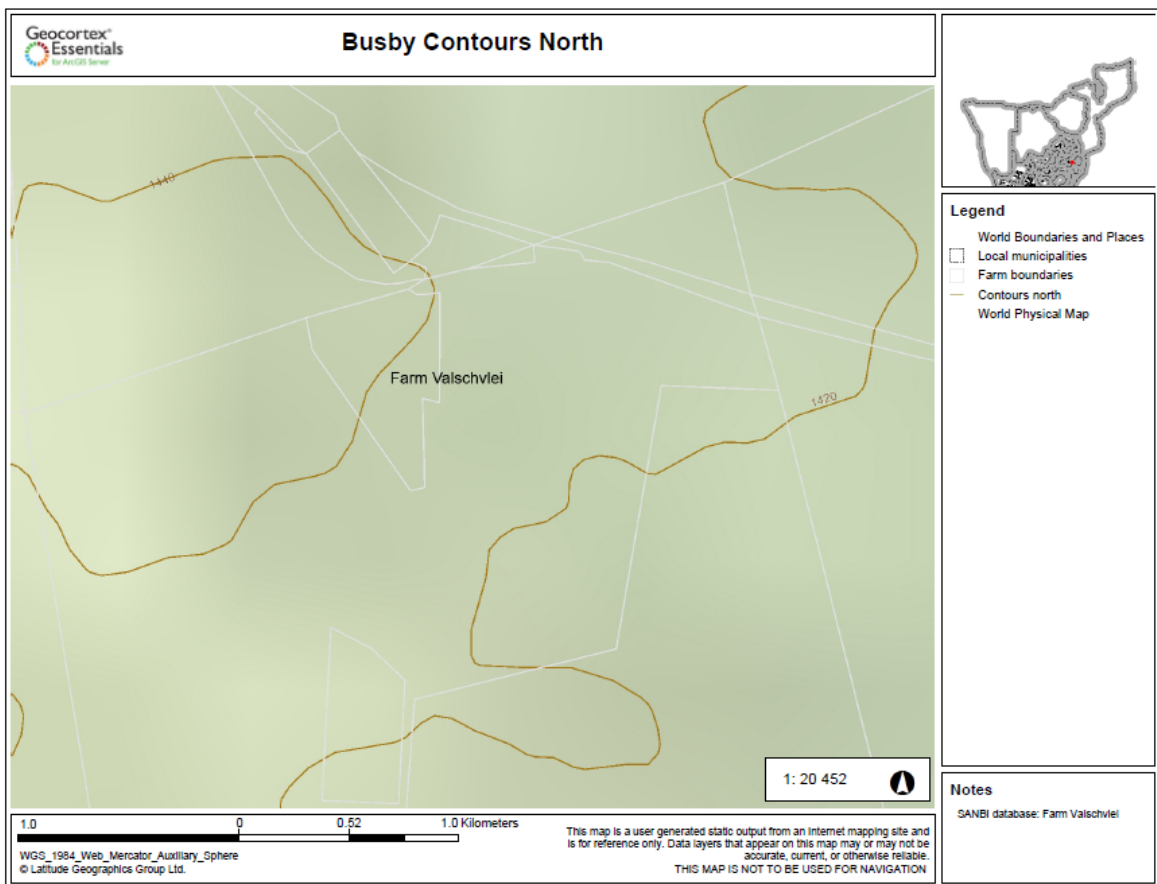


Figure 11: Contours associated with the project site, indicating the relative flatness of the site.

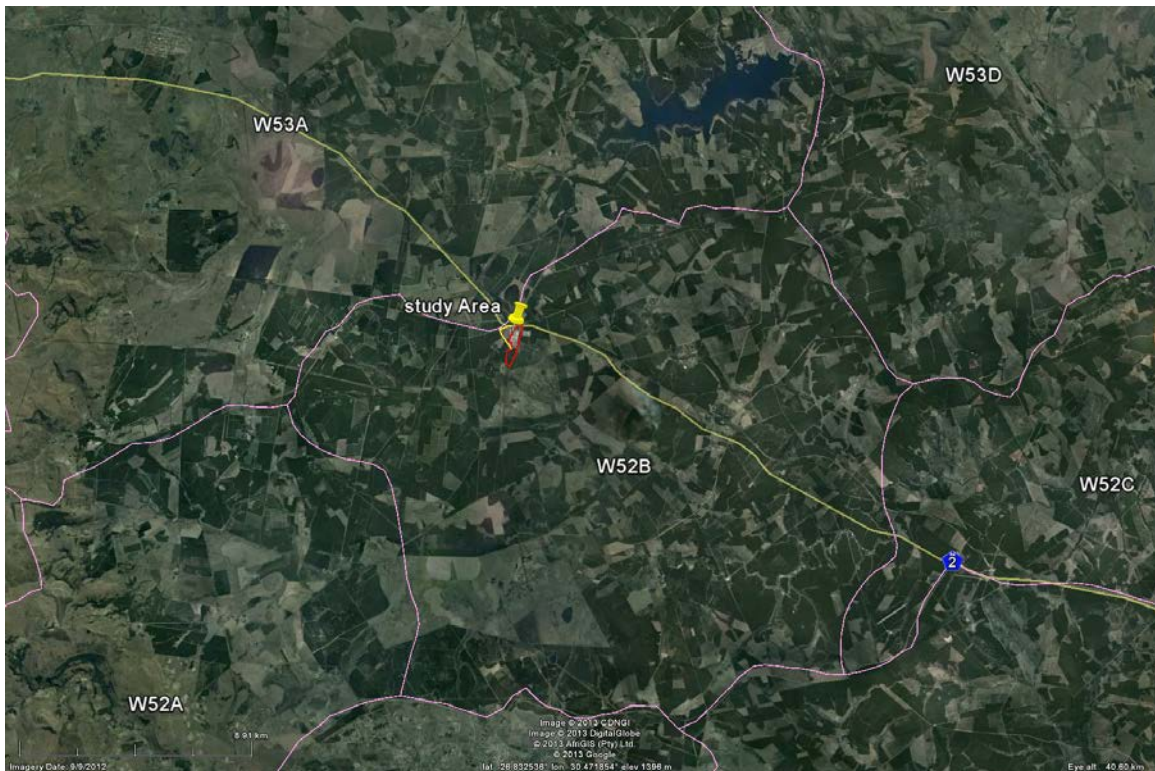


Figure 12: Quaternary catchments associated with the project site

4.2.1. Climate

The site falls within the summer rainfall area of South Africa. Daily summer temperatures range between 8°C and 23°C. Winter temperatures range between 7°C and 12°C. Spring temperatures range between 8°C and 16°C, while autumn temperatures range between 15°C and 17°C.

Table: 1. Temperatures and average precipitation associated with the site and surrounding areas

Annual average high temperature:	22.1°C
Annual average low temperature:	7.3°C
Average temperature:	14.7°C
Average annual precipitation:	745 mm

Rainfall data for the following rainfall station is available from 1967-2004:

Sheepmoor (4443/523): 754 mm/a

The station is located at 26 43 S, 30 18 E. Rainfall is predominantly in the summer months between October and March. The nearest evaporation station is at Jericho Dam (W5E004), which has an annual S-pan evaporation of 1511 mm/a.

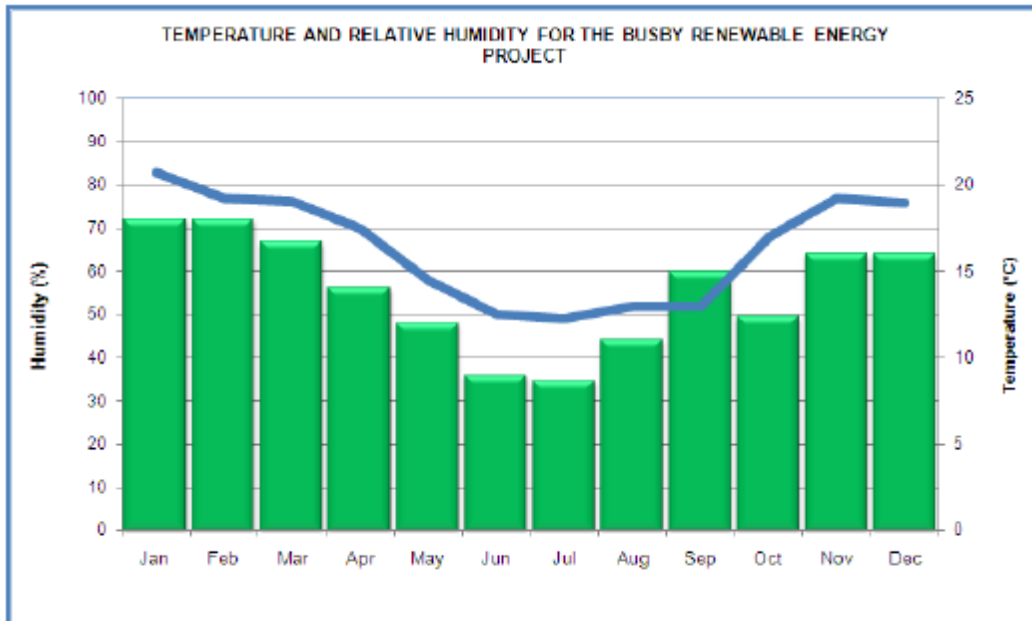


Figure 13: Monthly average temperature and humidity for the Busby Renewable Energy Plant for the January 2009 to December 2012 period

The predominant wind direction in the area is mainly from the East and North Eastern direction. Secondary winds are noted from the North and North Western direction. At the site, 19% of the time, calm conditions are present over the area. The highest frequency of wind speeds lie between 3.6 - 5.7 m/s and 2.1 – 3.6 m/s which occurred for 32% and 22% of the time respectively. Figure 14 below represents a wind rose for the area, indicating the predominant direction and speed of the wind.

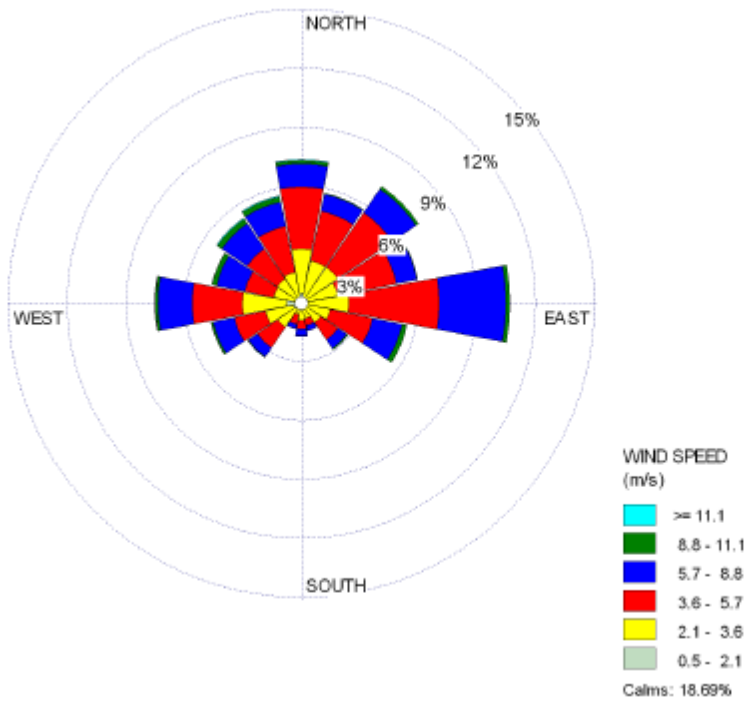


Figure 14: Period wind rose for Busby Renewable Energy Plant for the January 2009 to December 2012 period

The site experiences very stable conditions which are characteristic of low winds, clear skies and cold night-time conditions.

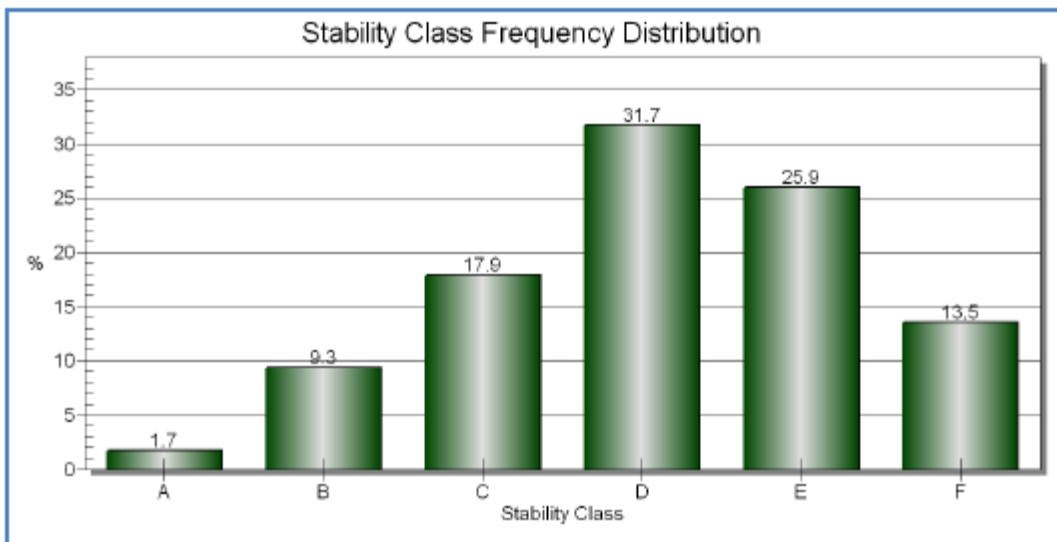


Figure 15: Stability class frequency distribution

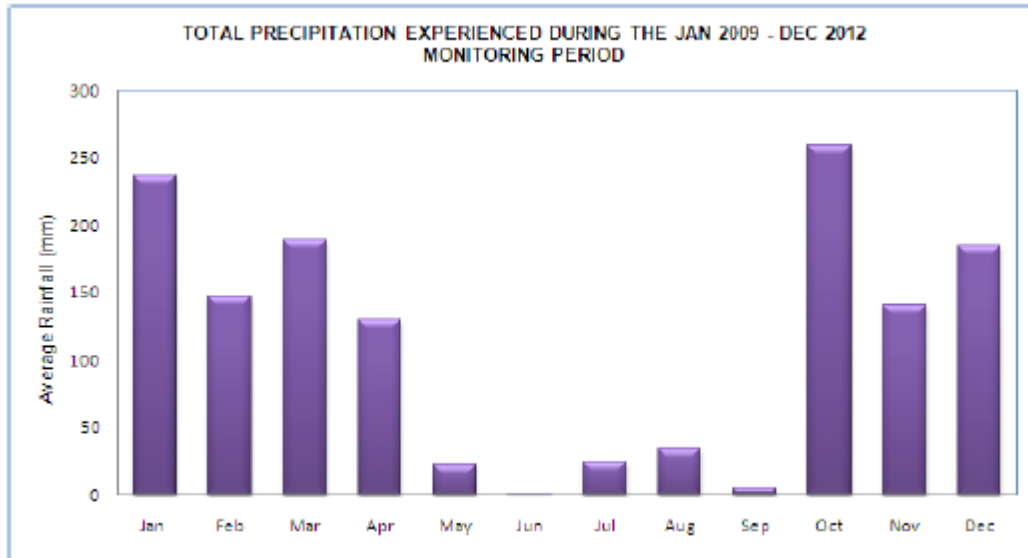


Figure 16: Total precipitation experienced in the Ermelo area during the January 2009 to December 2012 monitoring period

4.2.2. Geology

The site is underlain by horizontally bedded sedimentary medium to coarse grained sandstones and shales of the Vryheid Formation (Pv) of the Ecca Group. These lie unconformably over much older granites which outcrop to the east (Rg) (Figure 17). The site is not associated with dolomitic rock. The contact between the Vryheid Formation and underlying weathered granite can often be high yielding. Most of the farm Valschvlei lies on low yielding granites. A NNE trending dyke (shown as a dashed blue line in Figure 17) lies immediately to the east of the property, which could be a high yielding groundwater target feature.

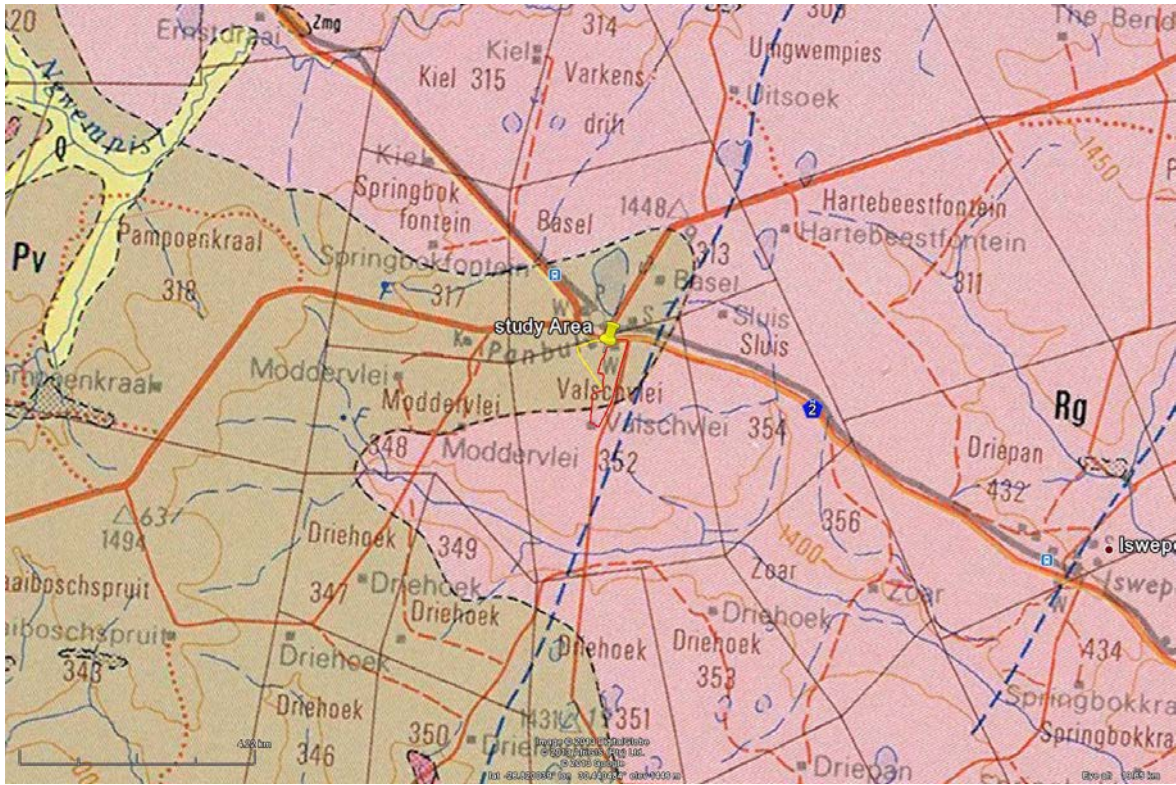


Figure 17: The geology associated with the Project Site

4.3. Soils

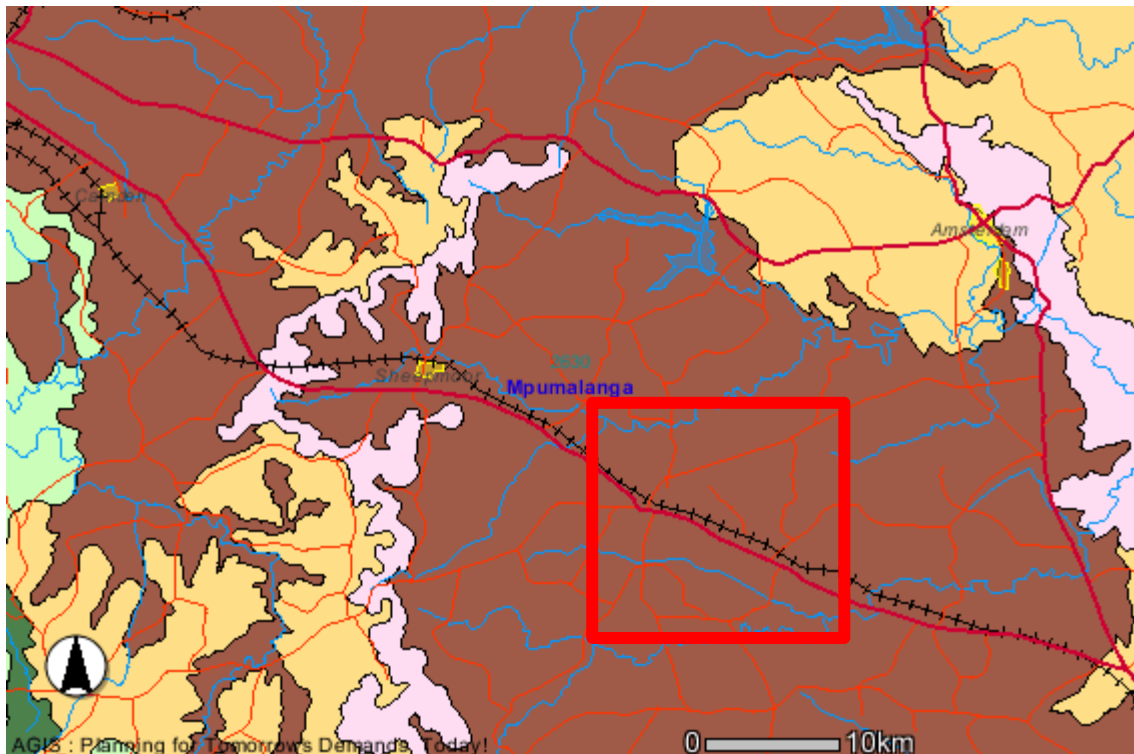


Figure 18: The general soil classes associated with the project site and immediate environment (red square)

The area indicated by the map above, falls within soil class BA and a description is provided in the table below:

Rec	Depth Class	Depth	Clay Class	Clay	Leaching Class	Leaching	Soil Class	Description	Soil Class
1	m	>= 450 mm and < 750 mm	I	>= 15% and < 35%	d	Mesotrophic to eutrophic soils	BA	Red, yellow and greyish soils with low to medium base status	Soils with a Plintic Catena

The soils associated with this area are also categorized as having a low sediment delivery potential and as such is not susceptible to wind or water erosion. The following data was downloaded from Agricultural Geo-referenced Information System website: <http://www.agis.agric.za>



Figure 19: Sediment delivery potential of the Project Site (red outline)

During a geo-technical investigation, it was noted that soil material comprise of two horizons with an upper dark greyish brown, loose clayey silty sand with an average thickness of 0.31 m and a deeper light yellowish brown, very loose, intact, clayey silty sand. This horizon occurs to between 0.63 m and 0.96 m below ground level. The residual shale comprise of moist to wet, yellow to greyish brown, mottled, medium-dense to dense, intact, gravelly clayey silt with Fe and Mn nodules in the upper approximately 0.5 m becoming greyish brown to yellowish brown, mottled, very dense, sandy clayey silt, highly ferruginised residual shale. The soil profile generally comprise of man-made ground over natural transported soils with ferruginised residual shale/siltstone from between 0.63 m and 0.96 m below surface. The upper site soils have a very high level of corrosiveness due to high electrical conductivities with some acidic conditions as well.

Water seepage occurred into the test pits between 0.9 m and 1.3 m below surface. The seepage occurred from the ferruginised residual shale horizon between 300 mm and 100 mm above the highly ferruginised material. This water level is assumed to be a perched groundwater level and may be due to natural percolation or possibly human activity. The relative

imperviousness of the ferruginised residuum and/or shale bedrock may cause perched groundwater tables to occur in the profile during the wet season. This is further supported by the ferruginisation and mottling in the profiles. The engineering geologist who undertook the study recommended that appropriate surface water precautionary measures are required to prevent excessive ingress of surface water or water from leaking services into the profile. Stormwater reticulation must provide proper drainage from the entire site and no accumulation of surface water must be allowed.

4.4. Water

4.4.1. Water Courses

The site falls within quaternary catchment W52B. No drainage lines, water courses or wetlands are present on site. No surface water will be abstracted and no effluent will be returned to the environment.

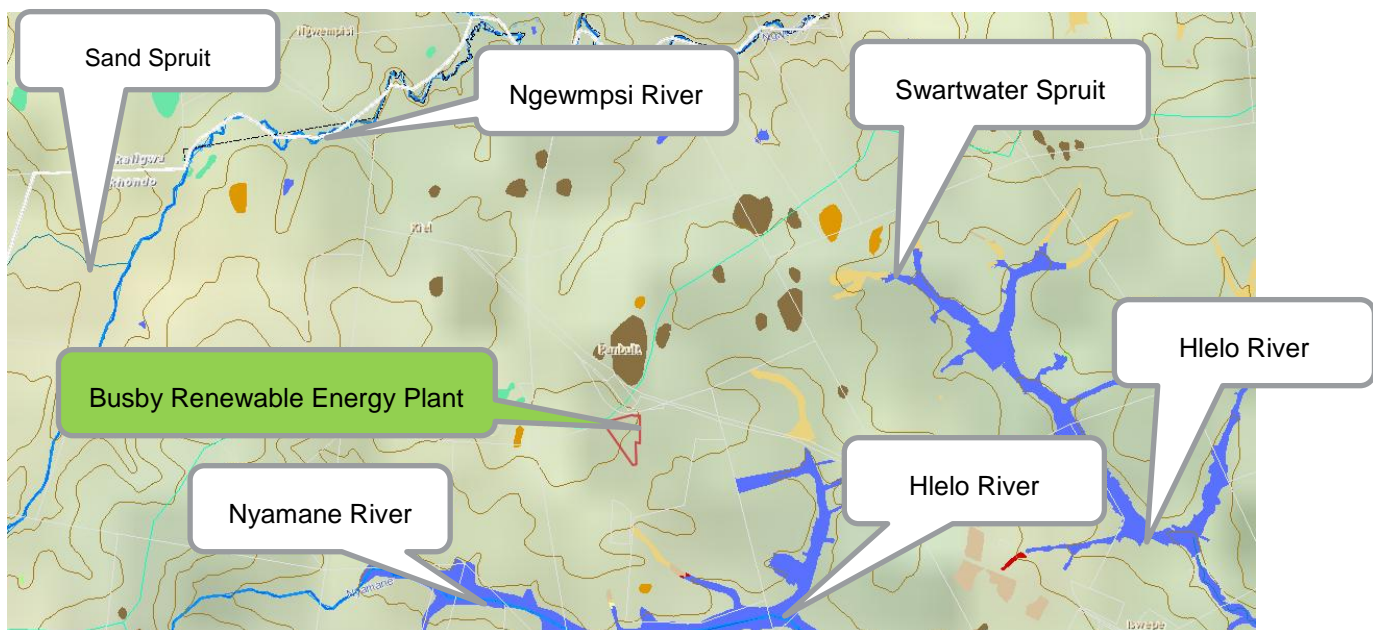


Figure 20: Water Courses in the region of the Project Site

Within the broader environment, the following water courses are present (as per Figure 20)

- The Sand Spruit is a first order Class C moderately modified stream
- The Nyamane River is a first order non-perennial river and a Class B largely natural stream and has been classified as endangered.
- The Ngewmpsi River is a first order Class C moderately modified stream.
- Hlelo River is a 5th order perennial stream
- Swartwater Spruit is a Class D (largely modified) first order stream in W53D.

4.4.2. Wetlands

No evidence of existing wetland vegetation could be found on site, especially since the site has been completely reformed from its pre-industrialised state since it existence for the past 50 years. The geo-technical study found a potential for perched ground water tables during the wet season, supported by ferruginization and mottling in the profiles.

The closest wetlands, based on data for Mpumalanga, are indicated on the map below:

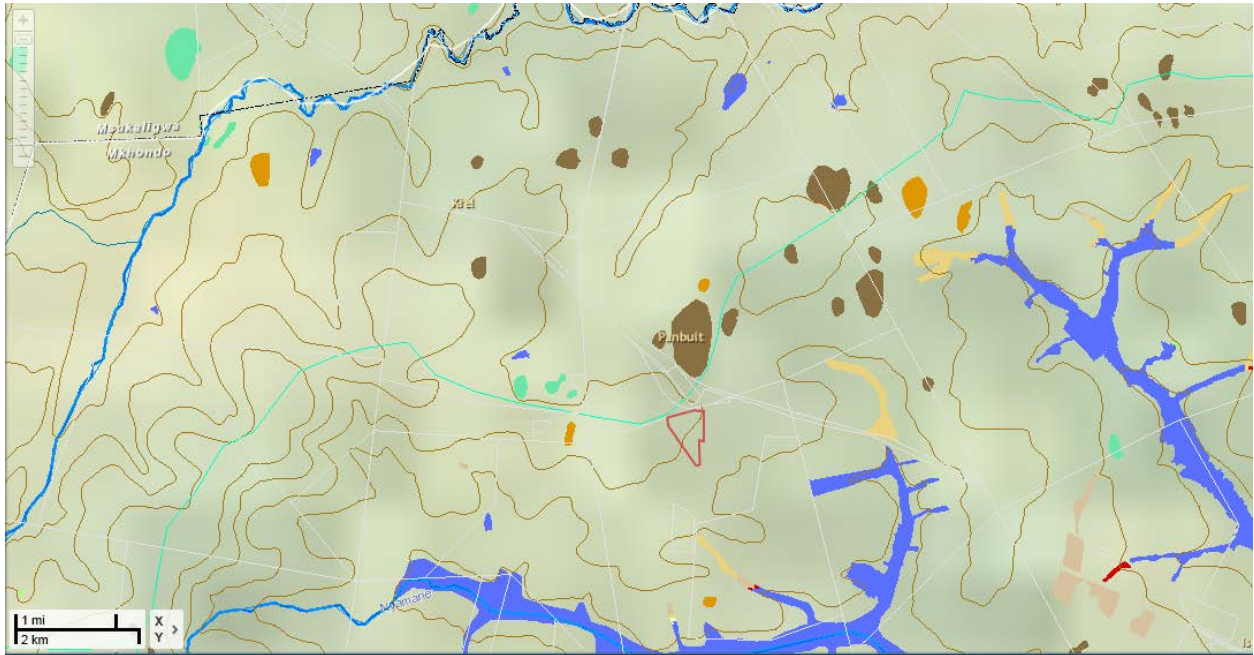


Figure 21: Wetlands (brown, yellow, orange and green) in the vicinity of the Project Site (indicated by the red block). (www.sanbi.org)

- The Panbult wetland directly to the north of the Project Site (brown) is a depression wetland and is approximately 300 m away. The proposed project and groundwater abstraction will not influence this wetland due to the nature of the hydrological regime associated with this type of wetland.
- The wetland to the left in a westerly direction (indicated in dark yellow) is a situated on a slope, is over 500m away and is also classified as a depression. The proposed project and groundwater abstraction will not influence this wetland due to the nature of the hydrological regime associated with this type of wetland.
- The wetland to the left in a westerly direction (indicated in green) are found on the valley floor, is over 500m away and have also been classified as a depression wetland. The proposed project and groundwater abstraction will not influence this wetland due to the nature of the hydrological regime associated with this type of wetland.
- The wetland to the south of the site (indicated by the light yellow strip) is approximately 1 km away and is a hillslope seep. The project site lies below this wetland and as such the proposed project and ground water abstraction will not have an influence on this wetland.

4.4.3. Ground Water

A NNE trending dyke (shown as a dashed blue line in Figure 17) lies immediately to the east of the property, which could be a high yielding groundwater target feature.

The yield potential of the Vryheid Formation is generally low, with a median yield of 0.6 l/s and only 20% of boreholes yield more than 2 l/s. Water is generally encountered in fractures below the weathered zone, and the unconformable contact between the sandstones and the granite is high yielding. The Groundwater Harvest Potential of catchment W52B is 37.3 mm/a, or 9016 m³/a for a 24.2 ha area. Harvest Potential is defined as the maximum volume of ground water that may be abstracted per area without depleting the aquifers. It is based on estimated mean annual recharge and a rainfall reliability factor, which gives an indication of the possible drought length.

The Harvest Potential represents a synthesis of the amount of groundwater in storage in an aquifer system, the recharge and the time span between these recharge events. The exploitation potential is 11.2 mm/a, or 2705 m³/a, or 7 m³/d for a 24.2 ha property. Average recharge from rainfall is estimated at 47 mm/a, or 11374 m³/a, which is 31 m³/d for a 24.2 ha property. Under natural conditions, baseflow to rivers is 42 mm/a, hence it is expected that significant groundwater abstraction will reduce baseflow.

The current ground water demands of the Sawmill in combination with that of its closest neighbour (Sonae Novobord) exceed their combined Harvest Potential of 90 m³/d. Consequently, the combined future abstraction at both properties will impact beyond both properties and on the surrounding lands. The impact of the proposed abstraction at Busby Renewables in combination with proposed future use by Sonae Novobord results in significant drawdown in the boreholes of both companies. Adequate ground water within the sustainable yield is available for the CURRENT use of Sonae Novobord as well as Busby Renewables current and required future use, without any significant detrimental impact on surrounding water users. A Water use license (WULA) will be required for the proposed abstraction and is in the process of being applied for.

Negotiations between Busby Renewables and Sonae Novobord in the above regard resulted in Busby Renewables adjusting their future water requirements from the initial 250 m³ per day to 180 m³ per day. (The water saving was accomplished by adjusting cooling technologies and water treatment technologies in order to ensure that effluent streams can be recycled. Rain water harvesting will also be investigated once the site is operational, to further reduce water requirements, where possible. It must be noted however, that assurance of supply is required to ensure the continued effective operation of the plant, and that an intermittent supply of rain water cannot replace the basic water requirement. Rain water harvested will thus replace ground water when available.) This figure includes the EXISTING registered use of the Busby Sawmill (52 m³ per day). These adjusted water requirements plus the proposed future abstraction by Sonae Novobord (for a resin plant) is still not within the sustainable yield range, as determined by the geo-hydrological report (refer to the Annexures for this report). Negotiations between Sonae Novobord and Busby Renewables are on-going in this regard.

The volume of water Busby Renewables is applying for to the DWA (150 m³/day) is in line with the recommended volume for Busby (160 m³/day) as indicated in the geohydrological report.

The actual increase of ground water abstraction will be 97 m³ when viewed against the current authorised use. Given that Sonae Novobord has not taken a firm decision to proceed with the proposed resin plant and given that Busby Renewables will begin with construction on the proposed renewable energy plant as soon as the required authorisations have been received, the DWA, as the custodian of water resources in South Africa, will be required to make a decision to allocate the applied for water volumes, based on the strategic nature of the water use (electricity generation is classified as a strategic Water Use by the DWA) as well as the projected socio-economic impact in the region as well as other relevant criteria.

4.5. Biological (Fauna and Flora)

4.5.1. MBCP: Terrestrial Biodiversity Assessment

The map below shows the results of the Mpumalanga terrestrial biodiversity assessment.

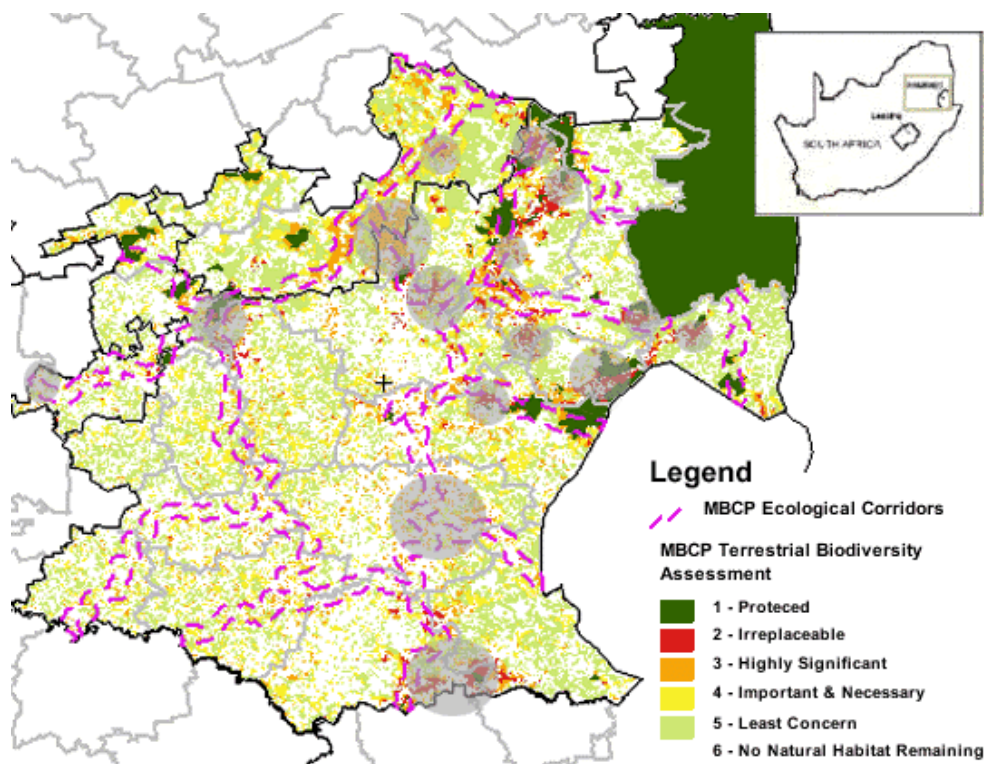


Figure 22: The results of the Mpumalanga terrestrial biodiversity assessment (SANBI, 2013)

The assessment categorized land parcels into different categories, which are indicated below:

Table: 2. Biodiversity Categories (Mpumalanga Biodiversity Assessment)

	Protected areas: already managed for biodiversity protection
	Irreplaceable: 100% Irreplaceable - no other options available to meet targets
	Highly Significant: 50 - 99% Irreplaceable - very limited options available to meet targets
	Important & Necessary: lower irreplaceability value, less than 50% but still required to meet targets
	Least Concern: areas of natural habitat that could be used to meet some targets but not needed now, as long as other areas are not lost
	No natural habitat remaining: virtually all natural habitat has been irreversibly lost as a result of cultivation, timber plantations, mining, urban development.

Brief descriptions of these biodiversity assessment categories are provided below.

Table: 3. Descriptions of biodiversity assessment categories

	<p>Protected areas: These include all formally proclaimed PAs on both state and private land. All are managed for biodiversity conservation and sustainable use. Such use includes: commercial nature based tourism, education, and limited production and harvesting of wild resources, especially game animals. State owned PAs are required to be managed in terms of formal management plans and to benefit local communities. All PAs contribute to meeting biodiversity targets, although not all were originally established for their biodiversity values. AREA: 4.4% (+10.4% KNP) already managed for biodiversity protection</p>
	<p>Irreplaceable: Irreplaceable areas are those of highest biodiversity value outside the formal PA network. They support unique biodiversity features, such as endangered species or rare habitat patches that do not occur anywhere else in the province. These features have already been so reduced by loss of natural habitat, that 100% of what remains must be protected to achieve biodiversity targets. All land in this category must be managed for biodiversity conservation to meet the targets set. All development must be strictly controlled in line with biodiversity conservation objectives. AREA: 2.4%</p>
	<p>Highly Significant: Highly significant areas are those where biodiversity has been heavily compromised and very few options remain to meet biodiversity targets. Natural vegetation cover in these areas should be maintained or restored. Any significant habitat loss may cause these areas to become irreplaceable. Approved developments or changes in land use must be compatible with conservation objectives, e.g. well managed livestock grazing. If development is unavoidable, such land uses must be made sufficiently dispersed and/or small scale, so as to be biodiversity friendly. Decisions on land use changes will require a biodiversity specialist study as part of the EIA. AREA: 12.3%</p>
	<p>Important & Necessary: Biodiversity in this category is relatively intact. It represents the areas which most efficiently contribute to meeting biodiversity targets and minimise land use conflict. If biodiversity is lost from these areas, larger areas will be required elsewhere for targets to be met. This category allows some flexibility and there are options for development. However, approved developments or changes in land use must still be compatible with conservation objectives. Decisions on land-use changes will require a biodiversity specialist study as part of the EIA. Developments most antagonistic</p>

	<p>to biodiversity should be discouraged. AREA: 9.5%</p>
	<p>Least Concern: These areas have biodiversity value in the form of natural vegetation cover. Although they are not currently required in order to meet biodiversity targets, they do contribute significantly to functioning ecosystems, including ecological connectivity. A greater variety of development choices exists in these areas. However they are still subject to National EIA legislation, where at least a scoping report is required for all listed activities. AREA: 25.2%</p>
	<p>No natural habitat remaining: This category covers the rest of the Province in which natural vegetation has been lost. It includes all land transformed by urban / industrial development and cultivation. Biodiversity is irreversibly changed, reduced to levels that are virtually dysfunctional. These landscapes have only residual or negative effects on the functioning of natural ecosystems. AREA: 35.8% <i>*(Note that for the purpose of visual representation, a light brown is used to indicate these sites on GIS Maps of the area).</i></p>
	<p>Ecological Corridors: The purpose of ecological corridors is to provide intact mega-pathways for long term biological movement. They are selected primarily along river-lines and altitudinal gradients to provide for the natural retreat and advance of plants and animals in response to environmental change. Where possible they are also selected to follow lines of intact natural habitat and to link areas holding the Province's most valuable ecological assets.</p> <p>Ecological corridors function at the landscape scale and for the very long term. Natural vegetation in corridors should be maintained, loss of natural habitat minimised, and restoration encouraged. Approved development or changes in land-use must be compatible with conservation objectives. Decisions on land use change may require a biodiversity specialist study as part of the EIA.</p>

4.5.2. Description of the site earmarked for the proposed development

This site falls within the Grass Land biome region and is specifically classified as Eastern Highveld Grassland. Eastern Highveld grasslands occur in the Gauteng and Mpumalanga Provinces at an altitude of 1 520 – 1 780 meters above mean sea level, but can occur as low as 1 300 meters above mean sea level. The short dense grassland is dominated by species commonly found in grasslands (*Aristida*, *Digitaria*, *Eragrostis*, *Tristachya* and *Themeda* among others). There are small rocky outcrops scattered throughout the grassland where some woody species and wiry, sour grasses occur (*Celtis africana*, *Acacia caffra*, *Parinari capensis*, *Diospyros lycioides* subsp *lycioides*, *Protea caffra*, *P. welwitschii* and *Rhus magalismsontanum*). The site is however, in the midst of extensive plantations of pine and eucalyptus species. Furthermore, the addition of the new infrastructure will take place on the existing footprint of the Sawmill, and as such no impact on sensitive species are foreseen.

Given the transformed flora of the area (extensive plantations), as well as the current nature of the site (brownfields, and completely disturbed and transformed to an industrial use) as well as the immediate surrounding sites (which include Sonae Novoboard, grain silo's, roads and trail road infrastructure) no fauna of significance is expected to occur on the site.

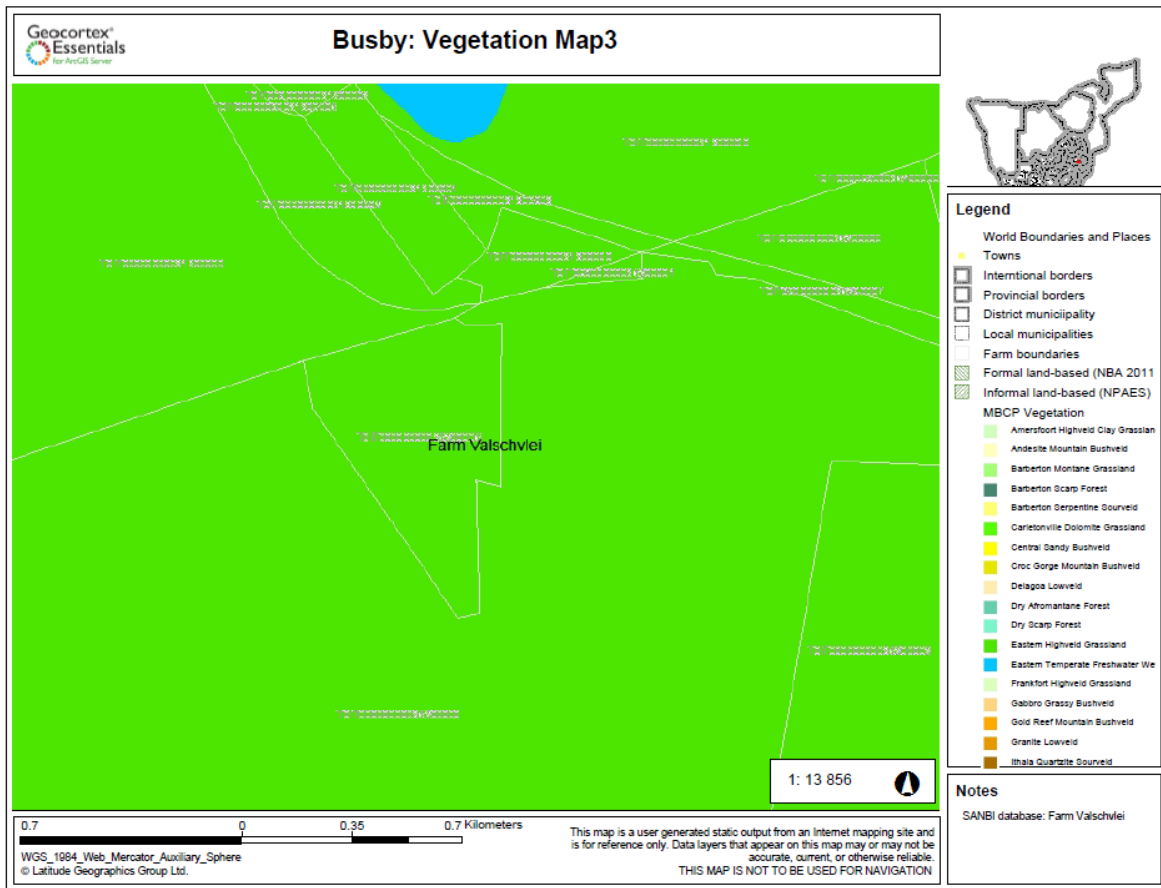


Figure 23: Vegetation type associated with the Site (SANBI, 2013, www.bgis.co.za)

It can be seen from the map below, (based on the Mpumalanga Biodiversity Assessment) that no natural habitat has remained on or in the immediate area of relevant portion of the farm Valschvlei. Biodiversity has been irreversibly changed and reduced to levels that are virtually dysfunctional (SANBI, 2013). A few portions of “least concern” and “important and necessary” have remained in the region or on the outer- boundaries of the farm. The map was generated based on data maintained by the South African National Biodiversity Institute (SANBI).

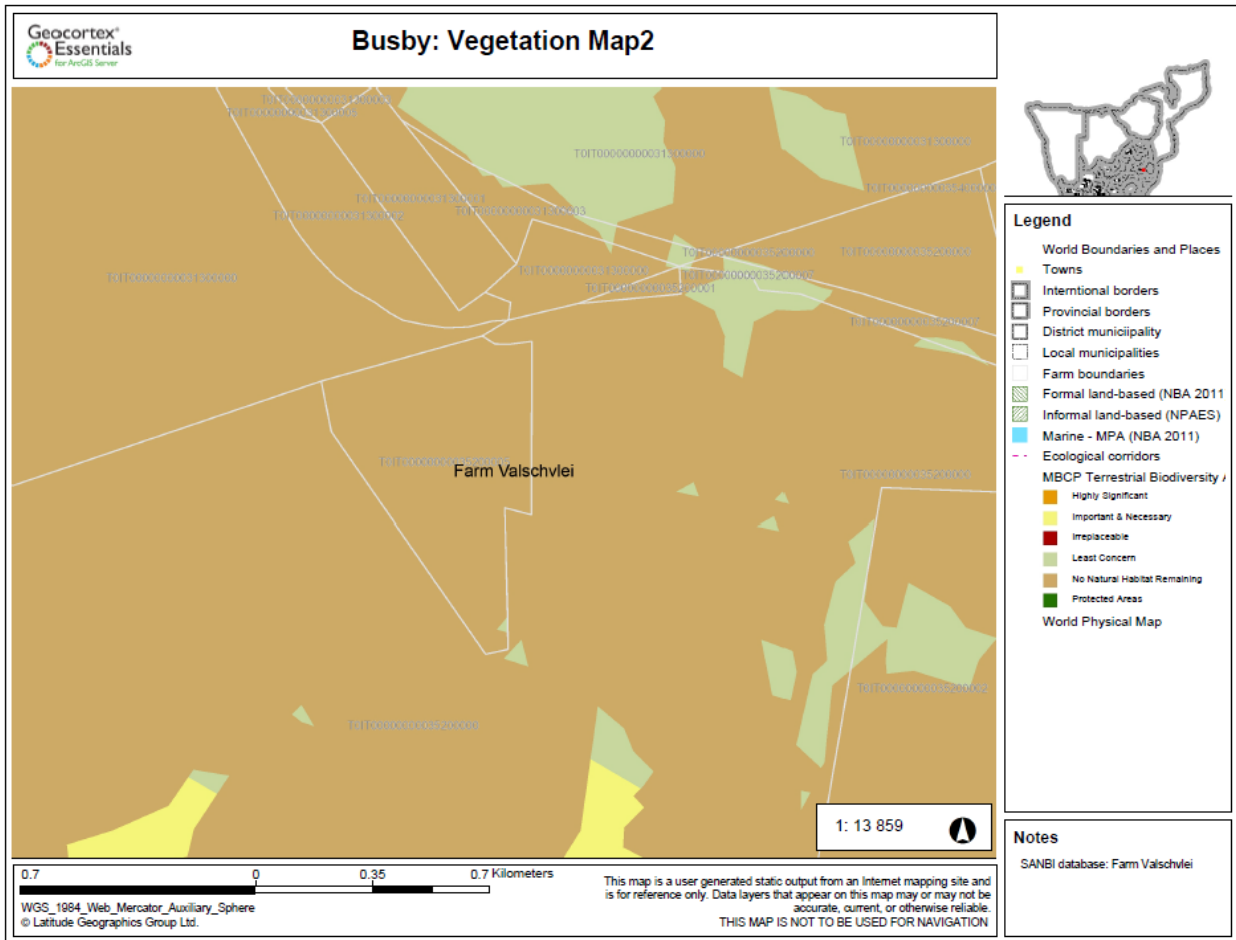


Figure 24: Terrestrial biodiversity of importance, indicating that no natural habitat has remained (light brown area) (SANBI, 2013, www.bgis.co.za)

The area falls within an area of highly significant **aquatic** biodiversity, but no water courses or wetlands are present on site and as such no impacts are foreseen.

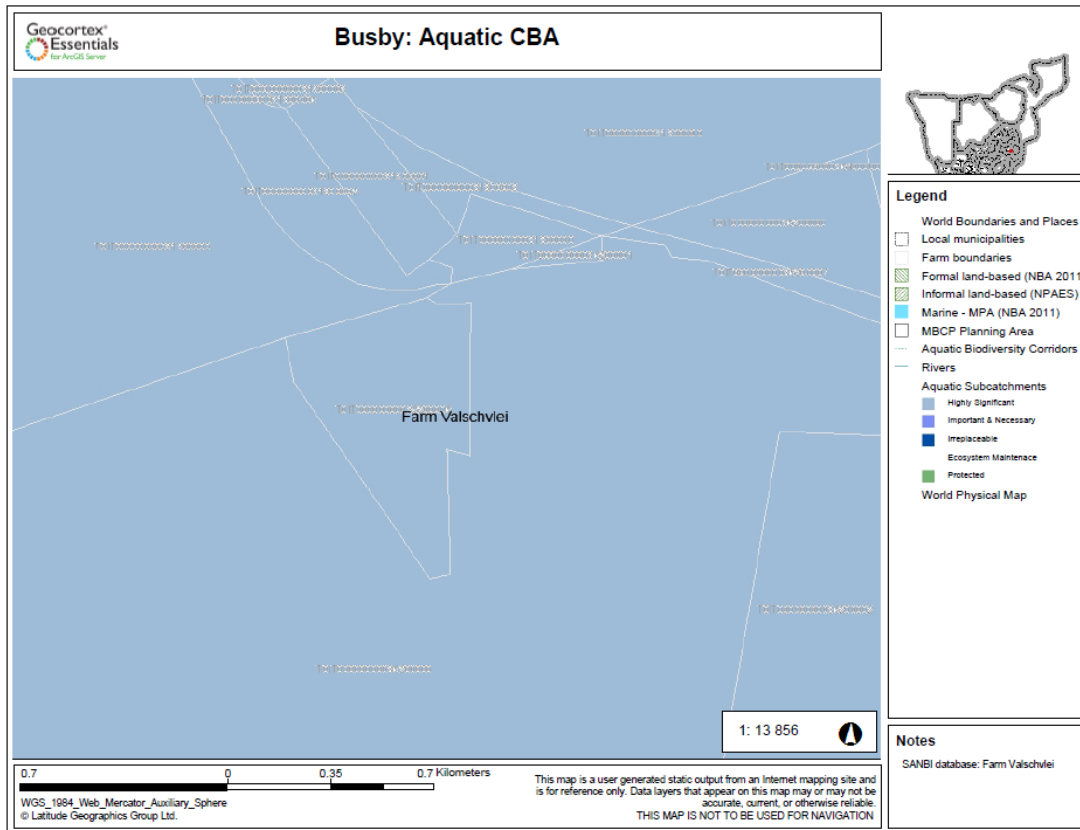


Figure 25: Aquatic biodiversity of importance (SANBI, 2013, www.bgis.co.za)

4.6. Socio-economic

All information in this section was obtained from the Gert Sibande District Municipality IDP (2012/2013 – 2016/2017).

4.6.1. Demography

The site falls within the Mkhondo Local Municipality, which is part of the Gert Sibande District Municipality. Table 2 below provides an overview of the population in the Mkhondo local municipality, as well as the population numbers in the wider district.

Table: 4. Population distribution of local Municipalities in Gert Sibande district in 2007 (Municipal Demarcation Board: Municipalities of South Africa)

MUNICIPALITY	MALE		FEMALE		TOTAL POPULATION		
	NUMBER	%	NUMBER	%	NUMBER	%	DENSITY
Chief Albert Luthuli	90 554	20.7%	103 534	22.8%	194 088	21.8%	34.91
Msukaligwa	60 224	13.8%	66 050	14.6%	126 274	14.2%	20.99
Mkhondo	49 199	11.3%	57 260	12.6%	106 459	12.0%	21.8
Pixley Seme	29 906	6.8%	36 022	7.9%	65 928	7.4%	12.61
Lekwa	44 361	10.2%	46 769	10.3%	91 130	10.2%	19.88
Dipaleseng	18 698	4.3%	19 182	4.2%	37 880	4.3%	14.47
Govan Mbeki	143 905	32.9%	125 042	27.6%	268 947	30.2%	91.03
District Total	436 847	49.0%	453 859	51.0%	890 706	100.0%	27.97

According to the 2007 census, there were 106 457 people and 29 927 households in the Mkhondo Local Municipality. The average household size was 3.6 people per household. The municipality constituted 12% of the total number of people in the Gert Sibande District Municipality in 2007 (Mkhondo Local Municipality, 2011).

4.6.2. Unemployment and Employment

In 2007, 57% of the economically active people were employed. More specifically, for the ages between 15 and 65 a mere 33% was economically active. During this period the average annual income per individual was R1 281.54. Tables 3 and 4 provide an overview of the situation in the district.

Table: 5. Sector employment per local municipalities Gert Sibande, 2010 (Municipal Demarcation Board: Municipalities of South Africa)

ECONOMIC SECTOR	CHIEF ALBERT LUTHULI	MSUKALIGWA	MKHONDO	DR PIXLEY KA ISAKA SEME	LEKWA	DIPALESENG	GOVAN MBEKI	GERT SIBANDE
Agriculture	9.7%	24.2%	24.0%	7.9%	20.6%	5.5%	8.2%	100
Mining	3.6%	10.3%	5.4%	0.9%	23.9%	0.9%	55.0%	100
Manufacturing	2.7%	7.5%	8.4%	2.0%	9.6%	1.0%	68.6%	100
Utilities	2.7%	10.4%	5.7%	19.2%	36.5%	6.0%	19.6%	100
Construction	6.6%	13.6%	7.4%	12.7%	10.9%	2.6%	46.2%	100
Trade	8.7%	15.3%	8.6%	5.9%	10.9%	2.3%	48.3%	100
Transport	9.3%	20.9%	8.9%	5.7%	9.7%	1.7%	43.8%	100
Finance	5.7%	19.1%	8.5%	6.4%	11.2%	1.6%	47.4%	100
Community services	13.2%	19.9%	13.9%	5.9%	16.9%	3.1%	27.1%	100
Households	6.3%	18.3%	12.7%	7.3%	17.4%	3.5%	34.4%	100
Total	7.5%	16.1%	11.3%	5.6%	15.7%	2.6%	41.2%	100

Table: 6. Unemployment rates in Mpumalanga, Gert Sibande and its local municipalities (1996 – 2010) (Municipal Demarcation Board: Municipalities of South Africa)

REGION	1996	2001	2010
Gert Sibande	17.3%	29.1%	27.2%
Chief Albert Luthuli	28.1%	40.6%	42.7%
Msukaligwa	15.5%	25.9%	25.3%
Mkhondo	16.2%	28.2%	28.0%
Dr Pixley ka Isaka Seme	14.1%	22.5%	23.1%
Lekwa	13.5%	25.5%	25.4%
Dipaleseng	16.4%	32.0%	35.0%
Govan Mbeki	16.9%	28.5%	23.0%
CRDP areas	20.8%	32.5%	33.1%
Non-CRDP areas	15.8%	27.5%	24.6%

4.6.3. Human Development Index

The Human Development Index (HDI) is a composite, relative index that attempts to quantify the extent of human development of a community. It is based on measures of life expectancy, literacy and income. The HDI can assume a maximum level of 1, indicating a high level of human development, and a minimum value of 0.

According to the United Nations, HDI is considered high when it is 0.8 and higher, medium when it ranges between 0.5 and 0.8 and an index value of 0.5 and lower will be considered as a low rating. Figure 25 below indicates that the HDI of the Mkhondo District Municipality has been experiencing a steady decline.

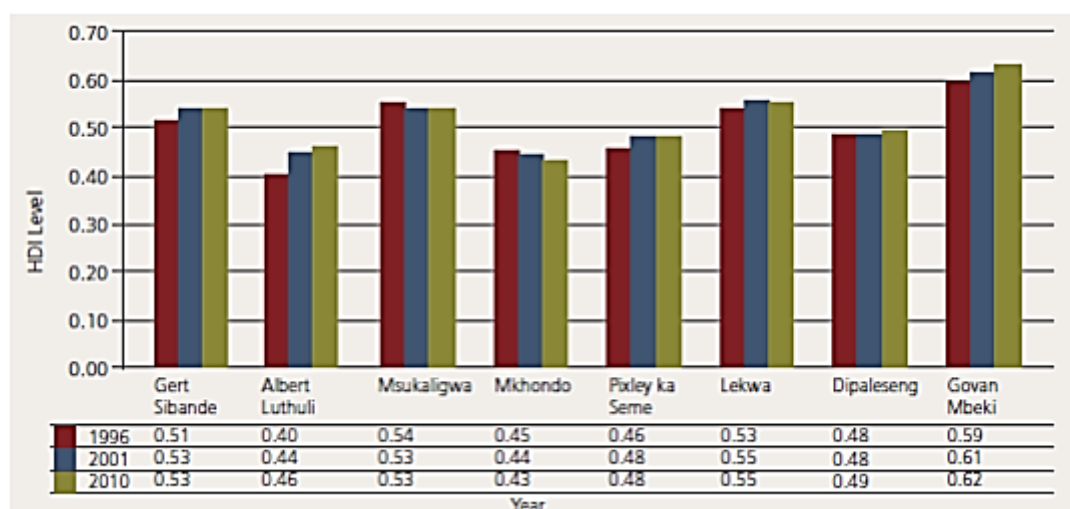


Figure 26: Human Development Index (HDI) in Gert Sibande and its local municipalities, 1996 – 201 (Global Insight – ReX, August 2011)

4.6.4. Gini-Coefficient

Gini-coefficient is summary statistic of income inequality and is used to show the skewness of income across the population. The Gini-coefficient varies from 0 (in the case of perfect equality where all households earn equal income) to 1 (in the case where one household earns all income and other households earn nothing).

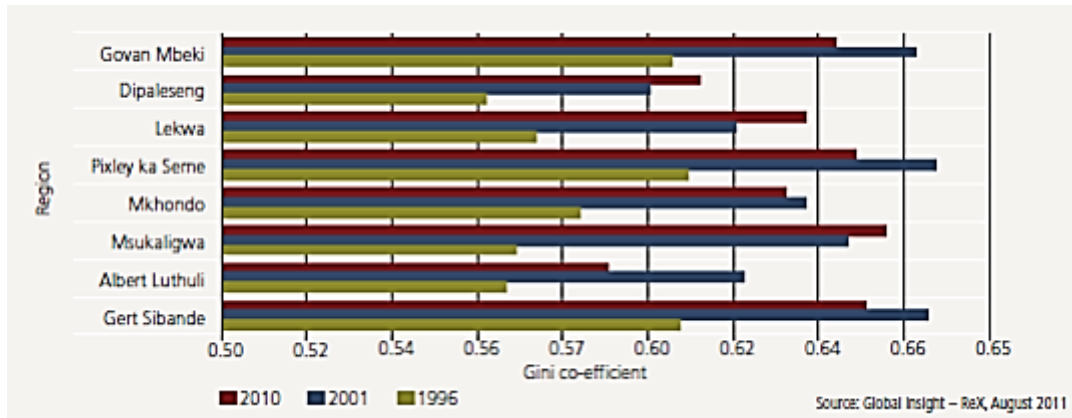


Figure 27: Gini-coefficient in Gert Sibande and its local municipalities, 1996 – 2011 (Global Insight – ReX, August 2011)

4.6.5. Major Economic Activities

The most important employment sector in the area is agriculture and forestry, at 36% of the total Gross Geographical Product. The balance of this employment sector is further represented as follows:

- Community services at 18%
- Trade at 13% and
- Manufacturing at 12%

These figures indicate that agriculture and forestry will remain important sectors in this municipality.

4.6.6. Regional Economic Growth

Key sectors that stimulate the economy of the broader district area are:

- Manufacturing (mainly SASOL)
- Mining of coal, gold, quarry etc.
- Energy Generation and Supply via Amajuba, Camden, Grootvlei and Thuthuka Power Stations
- Agriculture (crops and livestock)
- Forestry in the eastern parts of the area
- Tourism and
- Services

Areas like Standerton, Ermelo, Bethal and Piet Retief are strong in agricultural activities. The forest industry consists of forest plantations and primary processing industries which includes

dried and treated timber. Pulp and paper production, manufacturing of furniture, construction material like door and window frames comprises secondary industries. Tourism is not fully maximised yet and should further unlock potential in relevant areas. Mining is one of the main contributors to the province's GVA. Mining activities supports the generation of electricity through numerous coal fired power stations in the area. The products of mining, either electricity generation or petrochemical impacts the economy of the entire country.

4.6.7. Sub-Section Summary and Conclusion

It is evident from the information above, that the area is in great need for the creation of additional job opportunities for unskilled workers to address the high levels of unemployment. Given the geographic distances between towns in the area, the creation of employment opportunities for rural people are of specific importance.

4.7. Cultural and Heritage

The proposed project is a brownfield development and will take place on the existing footprint of the Busby Sawmill. No new linear activities are part of the proposed project. The existing boiler will be demolished; however this structure is not more than 60 years old. The existing boiler is unable to provide the required output for the proposed electricity generation and will be replaced with more efficient and modern technology. The new boiler technology will not only be more water efficient, but will have improved air emission control. It is therefore not foreseen that any cultural heritage objects will be impacted.

4.8. Noise

A noise *disturbance or nuisance* as defined in the national and provincial legislation means any sound which disturbs or impairs the convenience of any person. The Regulations describe a *disturbing noise* as noise that exceeds the ambient noise by more than 7 dB. This difference is usually measured at the location of the person experiencing the noise as disturbing. Therefore, if a new noise source is introduced into the environment, irrespective of the current noise levels, and the new source is louder than the existing ambient environmental noise by more than 7 dB, the noise can be construed as a disturbance.

The most applicable standard for use relevant to the proposed project is SANS 10103:2008 which provides typical rating levels for noise in various types of districts, as described in Table 7 below. SANS 10103:2008 defines daytime as between 06:00 to 22:00 hours and night time as between 22:00 to 06:00 hours. The rating levels in the table above indicate that in industrial districts the ambient noise.

Table: 7. Typical rating levels for noise in various types of districts

Type of District	Equivalent Continuous Rating Level, LReq.T for Noise					
	Outdoors (dB(A))			Indoors, with open windows (dB(A))		
	Day-night	Daytime	Night-time	Day-night	Daytime	Night-time
Rural Districts	45	45	35	35	35	25
Suburban districts with little road traffic	50	50	40	40	40	30
Urban districts	55	55	45	45	45	35
Urban districts with one or more of the following: Workshops; business premises and main roads	60	60	50	50	50	40
Central business districts	65	65	55	55	55	45
Industrial districts	70	70	60	60	60	50

Noise levels in industrial areas should not exceed 60 dB(A) at night and 70 dB(A) outdoors during the day. The day / night (24hour) rating limit is 70 dB(A). These levels can thus be seen as the maximum target levels for any noise pollution sources.

Current noise levels on site are associated with the activities of the Sawmill, which include vehicle movement and equipment for debarking, sawing and chipping of wood. Sonae Novoboard, is located next to the proposed site. Sonae manufactures a variety of wooden products and a certain level of noise is also associated with this site. It is not foreseen that that the proposed activities will raise the noise levels above 7 dB(A) relative to current levels. With the exception of worker housing, no residential areas are located in the immediate vicinity of the plant.

Based on feedback from the equipment manufacturers, noise in the immediate vicinity of the boiler equipment (such as fans) will not exceed 85 dB(A). It will however be required to execute a noise assessment study once the plant is operational, to determine whether noise impact thresholds will be breached. A noise baseline survey will have to be carried out (by switching of noise sources associated with the new plant). In the case of a breach, noise generating equipment will have to be screened off to prevent a noise nuisance.

4.9. Air Quality

An air quality impact study was commissioned for the purpose of the environmental impact assessment study. The study was executed by RHDHV and is attached as an Appendix to this document. No air emission license is required, given that the proposed operations falls below the thresholds of the National Environmental Management: Air Quality Act (Act No 39 of 2004).

During the baseline assessment, a qualitative approach was used to assess the baseline conditions in the project area. Local meteorological data was obtained from the South African Weather Services located in Ermelo for the period of January 2009 to December 2012. Applicable air quality legislation such as the National Environmental Management: Air Quality Act 39 of 2004 (GN163: 2005) and the Listed Activities and Associated Minimum Emission Standards (GN248: 2010) were reviewed. Existing sources of air pollution surrounding the biomass combustion plant were qualitatively assessed. Sensitive receptors, such as local communities, in close proximity to the plant were identified using satellite imagery.

Screen3 model was used to determine the potential areas of impact resulting from the proposed project. Screen3 model is a single source Gaussian plume model which provides maximum ground level concentrations for point, area, flare and volume sources as well as concentrations in the cavity zone and concentrations due to inversion break up and shoreline fumigation. The hourly maximum predicted concentrations will be compared to the applicable standards.

The major emissions of concern when using plantation residue for combustion, is particulate matter (PM). Emissions are dependent on the composition of the residue that is combusted and the particle control device. Oxides of Nitrogen may also be emitted in significant quantities when specific type of plantations residues is combusted or when operating conditions are poor. In comparison, NO_x emissions from wet barks and wood boilers are typically lower (approximately one-half) in comparison to NO_x emissions from dry wood fired boilers. If proper drying conditions are impaired or when secondary combustion is incomplete as a result, the combustion temperature is lowered which increases the emissions of PM, CO and organic compound emissions which can result regardless of the boiler type.

The Busby Renewable Energy Plant is located in the Highveld Priority Area. The Highveld Priority Area of South Africa is associated with poor air quality and has elevated concentrations of criteria pollutants which are attributed to both industrial and non-industrial sources. All industrial activities with listed activities operating within the Highveld Priority area are required to implement the Air Quality Management plan within their business plans. The Busby Renewable Energy Plant does not fall within industries operating under listed activities. Residential, educational and recreational land uses are considered to be sensitive receptors. Settlements were identified south west of the Biomass combustion plant (Figure 28). The settlements are worker housing for the sawmill operations. However the area surrounding the combustion plant is predominantly agricultural.



Figure 28: Sensitive receptors in the area of the Busby Renewables Energy Plant

Greenhouse gases such as carbon monoxide (CO), methane (CH₄) and nitrous oxide (N₂O) are also produced during wood residue combustion. Carbon dioxide (CO₂) is produced during the fuel combustion of carbon. The concentration of carbon monoxide as a result of CO₂ formation is insignificant. The formation of N₂O is dependent on many factors and its emission can be minimised when combustion temperatures are high (801°C) and excess air is kept at a minimum. Methane emissions are normally highest during periods of low temperature combustion, incomplete combustion and start up and shut down conditions. Taking into consideration the design capacity, plantation residue and information provided by the client, it is anticipated that the emissions from pollutants such as PM, NO_x and SO₂ are anticipated to be released from the biomass combustion operations.

Due to the lack of quantitative dust emission data for the site, it is recommended that precautionary principles be followed and dust control measures be implemented. Recommendations for the control of emissions resulting from the construction phase are shown in Table 8 below.

Table: 8. Recommendations for the control of fugitive dust emissions from the construction phase (USEPA, 1996)

Emission Source	Recommended Control Methods
Materials Handling (Debris)	Wind speed reduction
	Wet suppression ⁽¹⁾
Vehicle movements on unpaved roads ⁽²⁾	Wet suppression
	Paving
	Chemical stabilisation ⁽³⁾
General construction	Wind speed reduction
	Wet suppression
	Early paving of permanent roads

Note:

(1)

Dust control plans should contain precautions against watering programs that confound trackout problems.

(2) Loads could be covered to avoid loss of material in transport, especially if material is transported offsite.

(3) Chemical stabilisation is usually cost-effective for relatively long-term or semi-permanent unpaved roads.

The study concluded that:

All maximum predicted concentrations occurred at a distance of 800 m from the point source (stack). Mitigated and unmitigated concentrations were evaluated to determine the maximum impact resulting from the biomass combustion plant. In comparison to the hourly standards set for Nitrous oxide and Sulphur dioxide, both mitigated and unmitigated concentrations complied. Considering the remote location of the proposed plant, captive power of the boiler and the fact that controlled combustion of residue takes place; it can be assumed that the air quality impacts on the surrounding environment would be minimal. It must be noted that this assessment does not take into account cumulative impacts nor upset conditions. A summary table on the maximum predicted concentrations is shown in Table 9 below.

Table: 9. Summary table of maximum projected concentrations at 800 m from the stack

Pollutant	Concentration ($\mu\text{g}/\text{m}^3$)		
	SANS Limits	Maximum concentration ($\mu\text{g}/\text{m}^3$) - unmitigated	Maximum concentration ($\mu\text{g}/\text{m}^3$) - mitigated
PM10	⁽¹⁾	477.7	47.2
SO ₂	350	63.65	31.82
NO _x	200	63.65	9.54

5. Legislation and guidelines that have been considered in the preparation of the basic assessment report

The following legislation was considered in terms of this application.

5.1. Overarching/Framework legislation

5.1.1. Constitution of the Republic of South Africa (Act No 108 of 1996)

According to Section 24 of the Constitution: *“Everyone has the right to an environment that is not harmful to their health or well-being; and (b) to have the environment protected, for the benefit of present and future generations, through reasonable legislative and other measures that prevent pollution and ecological degradation; promote conservation; and secure ecologically sustainable development and use of natural resources while promoting justifiable economic and social development”.*

The proposed development can be considered as sustainable use of renewable natural resources whilst providing employment opportunities for unskilled and unemployed local people.

5.1.2. National Environmental Management Act (Act No 107 of 1998)

The National Environmental Management Act 107 of 1998 (NEMA) establishes a set of principles, which all authorities have to consider when exercising their powers during the granting of permits. The principles underpinning environmental management contained in the NEMA, as stated in Section 2 are that sustainable development requires the consideration of all relevant factors including the following:

- That the disturbance of ecosystems and loss of biological diversity are avoided, or where they cannot be altogether avoided, are minimised and remedied;
- That pollution and degradation of the environment are avoided, or, where they cannot be altogether avoided, are minimised and remedied;
- That the development, use and exploitation of renewable resources and the ecosystems of which they are a part do not exceed the level beyond which their integrity is jeopardised;
- That negative impacts on the environment and on people’s environmental rights be anticipated and prevented, and where they cannot be altogether prevented, are minimised and remedied.
- Development must be socially, environmentally and economically sustainable.
- Environmental management must be integrated and acknowledge that all elements of the environment are linked and interrelated, and it must pursue the best practicable environmental option.

- People and their needs must be placed at the forefront of its concern, and serve their physical, psychological, developmental, cultural and social interests equitably.

Section 28(1) states that “every person who causes, has caused or may cause significant pollution or degradation of the environment must take reasonable measures to prevent such pollution or degradation from occurring, continuing or recurring”. If such degradation/pollution cannot be prevented, then appropriate measures must be taken to rectify or minimise such pollution. These measures may include, but are not limited to:

- Assessing the impact of the project or development on the environment;
- Informing and educating employees about the environmental risks of their work and possible ways of minimising such risks;
- Ceasing, adapting or controlling actions which cause pollution/degradation;
- Preventing movement of pollutants;
- Eliminating the pollution source; and
- Remedying the effects of the pollution.

For this reason Regulations have been published which lists activities for which environmental impact assessments are required. The Environmental Impact Assessment Regulations in terms of Chapter 5 of the National Environmental Management Act (NEMA) (Act no. 107 of 1998) were promulgated on 18 June 2010 and include Regulations R544, R545 and 546.

- **Regulation GN R543:** Environmental Impact Assessment Regulations: provides for activities that may impact detrimentally on the environment to require prior environmental authorisation.
- **Regulation GN R544 and R545:** sets out lists of identified activities which may not commence without environmental authorisation from the competent authority and which must follow the basic assessment or full scoping EIA procedure as provided for in regulations 21 to 25 of the NEMA EIA Regulations.
- **Regulations GN 546:** sets out activities in specified regions of the country, for which an environmental authorization will be required.

The proposed project requires a basic assessment in terms of R544, as set out in Section 3.4 of this document.

5.2. Biodiversity

5.2.1. National Environmental Management: Biodiversity Act, 2004 (Act 10 of 2004)

This Act gives effect to ratified international agreements affecting biodiversity to which South Africa is a party, and which bind the Republic. Furthermore, the Minister may list ecosystems and species that are threatened or in need of protection. The Minister may also list threatening processes and activities in listed ecosystems and related to protected species. The Act also makes provision for the rehabilitation of ecosystems. The Minister may also promulgate a list of invasive species and the required measures associated with these.

Given the location of the proposed project on the existing footprint of a brownfield site, zoned for industrial use, it is not foreseen that any protected species will be affected.

5.2.2. National Environmental Management: Protected Areas Act (Act 57 of 2003)

The intention of the Act is to protect and conserve ecologically viable areas as well as their natural landscapes. The proposed site is not within or close to a formally protected area.

5.2.3. National Veld and Forest Fires Act (Act No 101 of 1998)

The purpose of this Act is to prevent and combat veld, forest and mountain fires throughout the Republic and provides for a variety of institutions, methods and practices for achieving the purpose. Chapter 4 places a duty on owners to prepare and maintain firebreaks. The procedure in this regard and the role of adjoining owners and the fire protection association are dealt with. Chapter 5 places a duty on all owners to acquire equipment and have available personnel to fight fires.

The location of the proposed plant amidst wide-spread plantations, will require specific measures that will be included in the environmental management plan (EMP) to prevent fires.

5.2.4. Conservation of Agricultural Resources Act, 1983 (Act No 43 of 1983)

The Act sets out measures to prevent the spread of alien vegetation. The legislation includes a list of alien and invasive species and the required measures to be taken in relation to these. The Act also provides for the regulation of control over the utilisation of agricultural resources in SA in order to promote the conservation of soil, water and vegetation (including wetlands). In accordance with the Act, authorisation is required to:

- i. drain or cultivate any vlei, marsh or water sponge
- ii. cultivate any land within the flood area of a water course or within 10 m outside the flood-area of a water course

- iii. divert run-off from a water course, or
- iv. burn veld, including wetland vegetation.

Regulation GNR 1048 of 24 May 1984 (as amended): makes provision of land through various measures, such as the prevention of soil erosion, the prevention of the disturbance of natural flow patterns and run-off, prevention of bush encroachment and makes provision for the restoration of land resources.

Measures will be included in the EMP to curb the spread of declared weeds and to prevent soil erosion.

5.3. Water

5.3.1. National Water Act (Act No 36 of 1998)

Water use is controlled by the National Water Act (Act no 36 of 1998)(NWA) and the enforcing authority is Department of Water Affairs (DWA). The NWA recognises that water is a scarce resource in South Africa and its provisions are aimed at achieving sustainable use of water to the benefit of all users. The provisions of the Act are thus aimed at discouraging pollution and waste of water resources. According to Section 21 of the National Water Act the following activity is considered a use, and therefore requires a permit:

(a) Taking water from a resource

An application for a water use licence for the abstraction of ground water will be submitted to the DWA.

The Act also makes amongst others, provision for the prevention and remediation of pollution, the handling and emergency incidences and the registration of dams with a safety risk.

Measures will be included in the EMP related to the prevention of the pollution of storm water run-off.

5.4. Waste

5.4.1. National Environmental Management Waste Act (Act 59 of 2008)

In July 2009, the National Environmental Management Waste Act (Act 59 of 2008) came into effect. This Act requires that any holder of waste must take all reasonable measures to –

- avoid the generation of waste and where such generation cannot be avoided, to minimise the toxicity and amounts of waste that are generated;
- re-use, recycle or recover waste;

- where waste must be disposed of, to ensure that the waste is treated and disposed of in an environmentally sound manner;
- manage the waste in such a manner that it does not endanger health or the environment or cause a nuisance through noise, odour or visual impacts;
- within that person's power, prevent any other person from contravening a provision of this Act in respect of the waste; and
- take reasonable measures to prevent the waste from being used for an unauthorised purpose.

The Minister published a list of waste management activities which require authorization under the Act. Government Notice R718 of 3 July 2009 lists Category A and Category B waste activities which requires any person undertaking such activities to perform a Basic Assessment Process or Scoping / EIA Process respectively. No person may commence, undertake or conduct a waste management activity listed in the GN R718 unless a license is issued in respect of that activity.

There are no activities associated with the proposed project that requires a Waste Management License Application. Confirmation has also been received from the DEA considering neither plantation residue nor the boiler ash as a waste products. The proposed project is well-aligned with the objectives of the Act, with reference to the avoidance of waste. Any waste that will be generated during construction and operation, will be disposed of in a manner compliant with the Act.

5.5. Atmospheric emissions

5.5.1. National Environmental Management: Air Quality Act (Act No 39 of 2004)

The Act provides for the protection of air quality in South Africa. Amongst others, no person may without a provisional atmospheric emission license or an atmospheric license conduct an activity that is listed in the Act. The Act also makes provision for ambient air quality standards related to criteria air pollutants in SA.

The proposed project does not require an air emission license but will be required to ensure that air quality is not deteriorated to the levels beyond these standards and where associated health impacts can occur. An air quality assessment has been done as part of the impact study associated with the application for environmental authorization.

It is however foreseen that regional air quality will be improved, given that the in-situ burning of plantation residue will be replaced by controlled burning and emission control equipment associated with the proposed plant.

5.5.2. Environment Conservation Act, 1989 (Act No 73 of 1989) – Noise Control Regulations in terms of Section 25 of the Environment Conservation Act, 1989: GN 154 of January 1992

The Regulations makes provision for the control of disturbing and nuisance noise. The site of the proposed project has been zoned as “industrial” and has been operational for several decades and it is not foreseen that the proposed project will contribute to the ambient noise levels in the area.

5.6. Heritage resources

5.6.1. National Heritage Resources Act No 25 of 1999 (Act No 25 of 1999 as amended)

No person may alter or demolish any structure or part of a structure which is older than 60 years without a permit issued by the relevant provincial heritage resources authority.

Subject to the provisions of subsections (7), (8) and (9), any person who intends to undertake a development categorised as—

- (a) the construction of a road, wall, powerline, pipeline, canal or other similar form of linear development or barrier exceeding 300m in length;
- (b) the construction of a bridge or similar structure exceeding 50 m in length;
- (c) any development or other activity which will change the character of a site—
 - (i) exceeding 5 000 m² in extent; or
 - (ii) involving three or more existing erven or subdivisions thereof; or
 - (iii) involving three or more erven or divisions thereof which have been consolidated within the past five years; or
 - (iv) the costs of which will exceed a sum set in terms of regulations by SAHRA or a provincial heritage resources authority;
- (d) the re-zoning of a site exceeding 10 000 m² in extent; or
- (e) any other category of development provided for in regulations by SAHRA or a provincial heritage resources authority,

The proposed project will not include any of the activities listed above.

6. Need and Desirability of the Proposed Activity

The proposed project has several benefits that are aligned with local, regional, national and international initiatives. It will also impact positively on several key issues of concerns. The benefits and positive impacts are described below.

6.1. Improving Air Quality in the Region

Local and regional air quality in that burning of in-situ plantation residues will be replaced with controlled burning of which the flue gas emissions will be controlled by air quality control equipment. Emissions will comply with national air quality standards.

6.2. Accidental Fires

Fires: The in-situ burning of plantation residues may give rise to accidental fires. Controlled burning of these residues may impact positively on incidences of accidental fires.

6.3. Electricity Generation

The project will supply electricity to the National Grid. Through supporting the electricity supply in South Africa, the project will assist to relieve pressure on the National Grid. The project will also supply renewable energy, supporting the national targets for the generation of renewable energy.

6.4. Carbon Development Mechanism (CDM)

The proposed project will allow for CDM credits (CERs) to be claimed under the Kyoto Protocol.

6.5. Creating job opportunities

- This project will increase local employment for skilled labour during construction and implementation of the renewable energy plant
- The renewable energy plant will permanently employ the following skilled labour for the operation and maintenance of the plant: 6 foreman, 6 millwrights and 12 operators. These people will be empowered with skills relating to the operation and maintenance renewable energy plants
- The renewable energy plant will also increase job opportunities for un-skilled labour as it is required for the harvesting and transportation of biomass to the renewable energy plant. This job opportunity consist of the following two levels:
 - Job opportunities to ensure biomass availability to the plant. This will consist of minimum 30 permanent employees, consisting of Bell drivers and their assistants, truck drivers and biomass packers.

- There is also a community aspect to the biomass collection, where the community may collect plantation waste to weigh on a weighbridge and earn cash immediately. The prediction is that around 100 jobs will be created in this way. From a community uplifting perspective, the 100 wood collectors that can generate an income from selling wood to the plant, can influence the lives of ±500 people positively if their families and their own lives are taken into account.

6.6. Economic benefits:

- The project will provide business opportunities for biomass suppliers, local labour contractors and equipment suppliers which will help increase the income of the people who are directly or indirectly connected with the project
- The project provides the potential for new sources of revenue from renewable energy, raises the economic benefits for the forestry industry, and promotes utilization of forestry waste, hence building a sustainable and circular economy.

The project will furthermore support the following provincial initiatives:

6.6.1. Mpumalanga Growth and Development Path

The primary objective of the Mpumalanga Economic Growth and Development Path (MEGDP) is to foster economic growth that creates jobs, and reduce poverty and inequality in the Province. The following main economic sectors (all of which occur in the Gert Sibande District) have been identified as key to spur economic growth and employment creation:

- Agriculture and forestry
- Mining and energy
- Manufacturing and beneficiation

6.6.2. The Green Economy

Key areas for intervention to facilitate growth and job creation in the green economy have been identified. The region falls within the Highveld high intervention priority area. Environmental degradation is highly noticeable in the district due to extensive opencast mining and deforestation and electricity generation from coal fired Power Stations. The promotion of clean energy generation e.g. wind, hydro and solar energy, as well as power generation from solid waste through gasification, need to be pursued.

6.6.3. Energy industry

Key areas for intervention to facilitate growth and job creation in the manufacturing sector comprise:

- Invest in industrial infrastructure to encourage enterprise development.
- Enhance skills development, especially in the areas of engineering, artisan, business and project management.

6.6.4. Economic Infrastructure

The proposed project will expand economic infrastructure in the Forestry industry in the area.

The District, in collaboration with its 7 constituent Local Municipalities and other stakeholders endeavours to optimise the impact of economic growth in the district through the proper implementation of the District Local Economic Development Strategy (2009) which addresses, among other key issues, the following:

- Increasing local beneficiation and shared Economic Growth across the District.
- Promoting and supporting sustainability of the existing businesses within the District.
- Identification and implementation of high impact LED projects/programmes like Bio-Fuel Plant as part of rural development
- Promotion of usage of alternative sources of energy.

6.6.5. Mpumalanga Rural Development Programme (MRDP)

The main objective of the Programme is to contribute towards an “improvement of the social and economic situation of the rural poor.” The programme focuses on the creation of income and employment in rural areas, and relevant key concepts of the programme include:

- Economic growth: encourage local economic development, employment and income generation through the promotion of small and micro-sized rural enterprises and the participation of the private sector
- Sustainability: improve viable and sustainable natural resource utilisation.

7. Identified Alternatives to the Proposed Activity

7.1. Site Alternatives

No site alternatives have been provided for the proposed project. The reason for the selection of the specific site is guided by the following:

- The selected site is a brownfield development with suitable industrial zoning. No land will therefore be sterilised for the purposes of ecosystem services or forestry activities
- Being located on the same site as the saw mill, will maximize the benefits associated with the use of sawmill residue as a source of biofuel.

7.2. Technology Alternatives

The developers of the proposed project have already chosen the following technologies to minimize environmental impacts associated with the project:

- Dry cooling technology as opposed to wet cooling: Dry cooling uses significantly less water than wet cooling. The use of dry cooling is however at a loss to the output generation capacity of the plant
- Water treatment technology: The proposed water treatment technology for the boiler feed water will avoid the generation of brine and promote the secondary use of water effluent for

ash quenching. Effluent water quality from the water treatment plant will be comparable to drinking water standards

- The proposed project will incorporate rain water harvesting to supplement its water requirements.

7.3. Alternative Design

The proposed project have been designed to fit in with the existing sawmill infrastructure onsite. As such, no alternative designs can be considered.

7.4. Scheduling Alternatives

No detailed information regarding the proposed time frame for the project is available yet, however it is anticipated that construction will start as soon as possible after all the necessary approvals have been obtained. Given that the project footprint will be placed on an existing brownfields site and that all associated infrastructure is required for the operation of the proposed plant, few viable scheduling alternatives is available.

7.5. Input Alternatives

Sawmill and plantation residues are the only viable source of renewable fuel on a large enough scale available in the area to ensure the viability of the project. The location of the project within the Mpumalanga area is also specific in order to make use of the available biomass in the area. As such, no input alternatives can be considered.

The project developers have also chosen to supplement ground water with harvested rain water in order to reduce reliance on ground water abstraction.

7.6. No-go option

The no-go option will lead to opportunity losses for:

- Employment creation
- CDM credits
- Renewable energy generation
- Contribute to relieving pressure on the national electricity grid
- Control of accidental fires associated with the in-situ burning of plantation residue
- Improvement of air quality
- The optimisation of the use of sawmill residues and plantation residue.

No real benefits will be obtained from a no-go option, other than the conservation of ground water resources in the area.

8. Description and Assessment of the Significance of any Environmental Impacts

8.1. Methodology to Rate and Assess Significance

Significance is the product of probability and severity rating divided by the mitigation potential:

$$\text{Significance} = \frac{\text{Probability} \times \text{Severity}}{\text{Mitigation}}$$

Probability and Severity will be determined based on the following:

8.1.1. Determining the Severity of an Impact

Determination of the severity of an impact is a function of intensity, duration and extent, divided by the extent to which mitigation can successfully be applied:

$$\text{Severity} = \text{intensity} + \text{duration} + \text{extent}$$

Each of the 4 factors used to determine the severity of an impact, are described below:

8.1.1.1. Intensity factor

The level of intensity is the sum of volume, toxicity, social impact and ecological impacts.

Note that either Volume A or Volume B is used (refer to the description) but never both at the same time.

Table: 10. Intensity factor rating and description

	Low (1)	Medium (3)	High (5)	Sub Total (Sum)
Volume (A) (refers to process input and output substances/ material or products)	Less than 80 m ³ at any one time (or low volumes relative to industry/commercial standards)	Between 80 and 300 m ³ at any one time (or medium volumes relative to industry/commercial standards)	In excess of 300 m ³ at any one time (or high volumes relative to industry/commercial standards)	

	Low (1)	Medium (3)	High (5)	Sub Total (Sum)
Volume (B) (refers to natural resources)	Relatively small	Medium	Large	
Toxicity	Toxicity is on par with everyday goods in wide-spread use and is biodegradable.	Toxicity can be compared to those that have to be handled with some caution and are non-biodegradable.	Toxicity is on par with toxic/dangerous/flammable substances that are non-biodegradable.	
Social	No or very limited impact	Some impact on immediate communities, but cannot be considered as disruptive	Major disruptive impact on surrounding communities	
Ecological	Natural functions not affected or negligible.	Environment affected but natural functions and processes continue (Some damage or wildlife injury may occur). Impact is reversible or irreplaceable loss will not occur	Environment affected to the extent that natural functions are altered to the extent that it will permanently or over the long term cease (Major damage or wildlife injury could occur). Irreplaceable loss will occur.	
Total				

8.1.1.2. Duration

Duration is assessed and a factor awarded in accordance with the following:

Table: 11. Duration factor rating and description

	Duration of Impact	Duration factor
Short term	The duration of the is impact is 1 Year or less	Factor 1
Medium term	The duration of the is impact is 1-5 Years	Factor 3
Long term	The duration of the is impact is 5 to 25 years	Factor 4
Permanent	The duration of the is impact is longer than 25 years and can be considered as permanent	Factor 5

8.1.1.3. Extent

Describes the physical extent the impact and factors are awarded according to the following:

Table: 12. Extent factor rating and description

	Extent of the impact	Extent factor
Site	The impact only exists within the activity's footprint	Factor 1
Local	The impact could impact on the whole or a considerable portion of the properties on which the activity is undertaken as well as neighbouring properties	Factor 3
Regional	The impact could affect the area, neighbouring as well as other areas further away than the immediate neighbours	Factor 5

8.1.2. Probability

Probability describes the likelihood of the impact actually occurring, and is rated as follows:

Table: 13. Probability factor rating and description

	Possibility that impact will occur	Rating
Improbable	Low possibility of impact occurring due to design or history	1
Probable	Distinct possibility that impact will occur	2
Highly probable	Most likely that impact will occur	3
Definite	Impact will definitely occur	5

8.1.3. Significance Rating

Following from the above, the Significance rating can now be determined as follows:

$$\text{Significance} = \text{severity} \times \text{probability}$$

The significance rating thus determined should influence the proposed project as described below:

Negligible (calculated Significance Rating < 25)

- *Positive and negative impacts of negligible significance are unsubstantial and should have little or no influence on the proposed development project.*

Low (calculated Significance Rating 25 < 50)

- The impact is limited and should not have a material effect on the decision to continue. Management intervention is required.

Moderate (calculated Significance Rating 50 < 90)

- Positive impact: Should weigh towards a decision to continue, should be enhanced in final design.
- Negative impact: Should weigh towards a decision to terminate proposal, or mitigation should be performed to reduce significance to a low significance rating.

High (calculated Significance Rating > 90)

- Positive impact: Continue
- Negative impact: If mitigation cannot be implemented effectively (into the moderate category), proposal should be terminated.

The table below provides an example of how the unmitigated significance ratings are calculated:

Table: 14. Calculating of Significance Ratings (Unmitigated)

Probability	Severity						Severity Rating	Significance Rating (Probability x Severity rating)	
	Intensity	+	Duration	+	Extent	=			
Probable 2	Low	4	Short Term	1	Local	2	7	14	Negligible
Probable 2	Low	4	Medium Term	3	Regional	3	10	20	Low
Definite 5	Medium	12	Medium Term	3	Local	2	19	85	Moderate
Definite 5	High	20	Permanent	5	Site	1	26	180	High

8.1.4. Mitigation

Mitigation will be calculated as follows:

Table: 15. Mitigation factor rating and description

Description	Factor Allocated
Mitigation is not possible or positive impact of mitigation is negligible. Impact remains irreversible.	1
Mitigation is possible to some extent with moderate levels of positive impact. Impact is largely reversible with only a small portion that remains as irreversible.	2
Mitigation is possible with moderate to high levels of positive impact. Impact is reversible.	3
Mitigation is possible to such an extent that all negative impacts are reduced significantly or eliminated. Impact is completely reversible.	4

$$\text{Significance} = \frac{\text{intensity} + \text{duration} + \text{extent}}{\text{Mitigation potential}}$$

8.2. Description and Assessment of Impacts Associated with the Proposed Project

The following aspects associated with the proposed project have been identified and will be assessed for their respective impacts:

Table: 16. Aspects and Impacts associated with the proposed project

ASPECT	IMPACTS TO BE CONSIDERED	Pre-mitigation significance rating	Mitigation measures	After mitigation significance rating
PHYSICAL				
Hydrology	<ul style="list-style-type: none"> The increase in concrete and impermeable surfaces will increase runoff from the site and increase erosion 	39	Storm water management plan	10
	<ul style="list-style-type: none"> Incorrect storm water management may lead to stagnant water on site due to the low permeability of the shale bedrock and/or ferruginized horizons 	39	Storm water management plan	13
	<ul style="list-style-type: none"> Excavation and construction may lead to soil washing away and increasing sediment loads in surface runoff 	20	Storm water management plan	7
	<ul style="list-style-type: none"> Ground water abstraction may deplete local aquifer and impact negatively on the availability of ground water by neighboring properties 	48	Hydro-geological study was commissioned Implementation of relevant recommendation	24
	<ul style="list-style-type: none"> Increased sediment loads in surface run-off from residue stock piles and ash storage facilities 	57	Storm water management plan	14

ASPECT	IMPACTS TO BE CONSIDERED	Pre-mitigation significance rating	Mitigation measures	After mitigation significance rating
	<ul style="list-style-type: none"> Boiler ash application in plantations may increase sediment load in surface run-off 	51	Boiler ash application plan	13
Noise	<ul style="list-style-type: none"> Increase in ambient noise levels in the area due to construction activities, increase in traffic and wood chipper operations 	39	Construction times and delivery of materials to site is to be limited to day light hours Screening of high noise generation areas or equipment	13
	<ul style="list-style-type: none"> Increase in instantaneous ambient noise levels associated with ash quenching. 	26	Screening of high noise generation areas or equipment	9
Air Quality	<ul style="list-style-type: none"> Increase in dust emissions during construction 	36	Dust suppression measures to be implemented	18
	<ul style="list-style-type: none"> Increase in localized emissions of particulate matter, NOx and SOx from flue gas emissions 	115	Air quality control equipment will be installed with a 90% efficiency rating. Monitoring and maintenance plan to be developed and implemented. Boiler operation manual to be compiled to ensure optimum combustion temperatures and air flow is maintained, to minimize emissions related to incomplete combustion. Boiler operators are to be trained in the procedure.	29
	<ul style="list-style-type: none"> Increase in dust and diesel exhaust fumes from increased truck movement to and from the site, delivering biomass for use as fuel 	75	Dust suppression measures to be implemented Maintenance of trucks to prevent inefficient combustion and high emission rates of exhaust gasses	38

ASPECT	IMPACTS TO BE CONSIDERED	Pre-mitigation significance rating	Mitigation measures	After mitigation significance rating
	<ul style="list-style-type: none"> Increased levels of low level atmospheric particulate matter associated with biomass off-loading 	39	Dust suppression measures to be implemented	13
	<ul style="list-style-type: none"> Decrease in air quality impacts due to wide-spread biomass burning associated with in-situ burning of plantation residues 	115	Positive impact	115
	<ul style="list-style-type: none"> Increased atmospheric levels of particulate matter associated with boiler ash removal, storage and transport 	45	Boiler ash application plan	11
	<ul style="list-style-type: none"> Particulate matter dispersal from residue stock piles and chipper operations 	45	Dust suppression measures to be implemented	23
	<ul style="list-style-type: none"> Reduced carbon emissions associated with energy from a renewable source 	110	Positive impact	110
Solid and liquid Waste	<ul style="list-style-type: none"> Waste produced during construction, especially during demolition of the existing boiler may impact on the surrounding land 	30	Re-use of waste material to take place where viable. Waste management plan to be compiled and implemented.	8
	<ul style="list-style-type: none"> Increase in the volumes of general office waste generated on site due to the increased number of people present on site 	39	Office waste will be managed with current waste generated on site	13
	<ul style="list-style-type: none"> Increase in the volumes of sewage generated on site due to the increased number of people present on site 	51	Adequate sanitation facilities on-site to be ensured	17
Soil	<ul style="list-style-type: none"> Over application of boiler ash may lead to deterioration of soil quality in the plantations 	51	Boiler ash application plan	17

ASPECT	IMPACTS TO BE CONSIDERED	Pre-mitigation significance rating	Mitigation measures	After mitigation significance rating
	<ul style="list-style-type: none"> • Compaction of soil by heavy machinery during delivery of boiler ash for the purposes of application in plantations 	45	Boiler ash application plan	15
BIOLOGICAL				
Flora	<ul style="list-style-type: none"> • Alien species may establish due to disturbance during construction 	33	Quarterly inspection of the site Rehabilitation and re-vegetation of disturbed areas with a suitable specie	8
	<ul style="list-style-type: none"> • Boiler ash application in plantations may impact on undisturbed/natural areas 	32	Boiler ash application plan	11
Fauna	<ul style="list-style-type: none"> • Boiler ash application in plantations may disturb fauna in natural patches on route to the site of application 	20	Boiler ash application plan	10
SOCIO-ECONOMIC				
Employment	<ul style="list-style-type: none"> • Increase in local employment opportunities. 	80	Positive impact	80
Economic	<ul style="list-style-type: none"> • Positive impacts on local economic development through the increase in regional domestic product 	64	Positive impact	64
Electricity supply	<ul style="list-style-type: none"> • Positive impact on the amount of electricity available in SA 	65	Positive impact	65
Renewable energy	<ul style="list-style-type: none"> • Positive impact on the availability of renewable energy 	85	Positive impact	85

ASPECT	IMPACTS TO BE CONSIDERED	Pre-mitigation significance rating	Mitigation measures	After mitigation significance rating
RESOURCE USE				
Use of non-renewable resources	<ul style="list-style-type: none"> The use of non-renewable resources during construction 	40	Use of recyclable material and locally obtained materials where feasible	40
SPILLAGES AND FIRE HAZARDS				
Spills	<ul style="list-style-type: none"> Pollutants such diesel fuel may lead to soil pollution and infiltrate groundwater. 	26	Spill management plan	9
Fires	<ul style="list-style-type: none"> Accidental or spontaneous combustion of the biomass stock piles on site leading to fire hazards in the surrounding plantations and deteriorating air quality 	50	Fire management plan	17

Table: 17. Significance ratings of aspects as identified

Description of impact	Volume	Toxicity	Social	Ecological	Intensity	Duration	Extent	SEVERITY	PROBABILITY	Pre-mitigation significance	Mitigation Rating	Post mitigation and final significance rating
The increase in concrete and impermeable surfaces will increase runoff from the site and increase erosion	3	1	1	1	6	4	3	13	3	39	4	10
Incorrect storm water management may lead to stagnant water on site due to the low permeability of the shale bedrock and/or ferruginized horizons	3	1	1	1	6	4	3	13	3	39	3	13

Description of impact		Volume	Toxicity	Social	Ecological	Intensity	Duration	Extent	SEVERITY	PROBABILITY	Pre-mitigation significance	Mitigation Rating	Post mitigation and final significance rating
	Excavation and construction may lead to soil washing away and increasing sediment loads in surface runoff	1	3	1	1	6	1	3	10	2	20	3	7
	Ground water abstraction may deplete local aquifer and impact negatively on the availability of ground water by neighbouring properties	3	1	3	1	8	4	4	16	3	48	2	24
	Increased sediment loads in surface runoff from residue stock piles and ash storage facilities	3	3	3	3	12	4	3	19	3	57	4	14
	Boiler ash application in plantations may increase sediment load in surface run-off	3	3	1	3	10	4	3	17	3	51	4	13
	Increase in ambient noise levels in the area due to construction activities, increase in traffic and wood chipper operations	1	1	3	1	6	4	3	13	3	39	3	13
	Increase in instantaneous ambient noise levels associated with ash quenching.	1	1	3	1	6	4	3	13	2	26	3	9
	Increase in dust emissions during construction	3	1	3	1	8	1	3	12	3	36	2	18
	Increase in localized emissions of particulate matter, NOx and SOx from flue gas emissions	3	3	5	3	14	4	5	23	5	115	4	29
	Increase in dust and diesel exhaust fumes from increased truck movement to and from the site, delivering biomass for use as fuel	1	3	3	1	8	4	3	15	5	75	2	38
	Increased levels of low level atmospheric particulate matter associated with biomass off-loading	3	1	3	1	8	4	1	13	3	39	3	13
Positive impact	Decrease in air quality impacts due to wide-spread biomass burning associated	5	3	5	1	14	4	5	23	5	115	1	115

Description of impact	Volume	Toxicity	Social	Ecological	Intensity	Duration	Extent	SEVERITY	PROBABILITY	Pre-mitigation significance	Mitigation Rating	Post mitigation and final significance rating
with in-situ burning of plantation residues												
Increased atmospheric levels of particulate matter associated with boiler ash removal, storage and transport	3	1	3	1	8	4	3	15	3	45	4	11
Particulate matter dispersal from residue stock piles and chipper operations	3	1	3	1	8	4	3	15	3	45	2	23
Positive impact Reduced carbon emissions associated with energy from a renewable source	3	3	3	3	12	5	5	22	5	110	1	110
Waste produced during construction, especially during demolition of the existing boiler may impact on the surrounding land	3	1	1	1	6	3	1	10	3	30	4	8
Increase in the volumes of general office waste generated on site due to the increased number of people present on site	1	3	3	1	8	4	1	13	3	39	3	13
Increase in the volumes of sewage generated on site due to the increased number of people present on site	1	5	3	1	10	4	3	17	3	51	3	17
Over application of boiler ash may lead to deterioration of soil quality in the plantations	3	3	1	3	10	4	3	17	3	51	3	17
Compaction of soil by heavy machinery during delivery of boiler ash for the purposes of application in plantations	3	1	1	3	8	4	3	15	3	45	3	15
Alien species may establish due to disturbance during construction	1	1	1	3	6	4	1	11	3	33	4	8
Boiler ash application in plantations may impact on undisturbed/natural areas	3	3	1	3	10	3	3	16	2	32	3	11

	Description of impact	Volume	Toxicity	Social	Ecological	Intensity	Duration	Extent	SEVERITY	PROBABILITY	Pre-mitigation significance	Mitigation Rating	Post mitigation and final significance rating
	Boiler ash application in plantations may disturb fauna in natural patches on route to the site of application	1	1	1	1	4	3	3	10	2	20	2	10
Positive impact	Increase in local employment opportunities.	1	1	5	1	8	4	4	16	5	80	1	80
Positive impact	Positive impacts on local economic development through the increase in regional domestic product	1	1	5	1	8	4	4	16	4	64	1	64
Positive impact	Positive impact on the amount of electricity available in SA	1	1	3	1	6	4	3	13	5	65	1	65
Positive impact	Positive impact on the availability of renewable energy	1	1	3	3	8	4	5	17	5	85	1	85
	The use of non-renewable resources during construction	1	1	1	3	6	1	3	10	4	40	1	40
	Pollutants such diesel fuel may lead to soil pollution and infiltrate groundwater.	1	3	1	1	6	4	3	13	2	26	3	9
	Accidental or spontaneous combustion of the biomass stock piles on site leading to fire hazards in the surrounding plantations and deteriorating air quality	3	5	5	3	16	4	5	25	2	50	3	17

After mitigation measures have been applied, it is evident that none of the identified negative impacts are of a high or even moderate significant rating. Six positive impacts have been identified.

8.3. Cumulative Impacts

Two of the impacts identified could have cumulative impacts. These are related to ground water abstraction and stack emissions.

With reference to ground water abstraction, a geo-hydrological study incorporated the use of ground water by surrounding persons and organisations and a sustainable yield was determined. The Busby Renewables Energy Plant will limit abstraction volumes to remain within the calculated sustainable yield. A water management plan will be compiled. The project will also make active use of rain water harvesting to further lower ground water demands.

The cumulative impacts of additional air emissions have not been calculated, as these must be seen against the regional context, where the cessation of in-situ burning of plantation residues will largely be off-set against controlled burning of plantation residue at Busby Renewables for the purposes of electricity generation. All stack emissions will be controlled by an electro-static precipitator (ESP) with a manufacturing guarantee of a 90% efficiency ratio. Stack emissions will be significantly below the current South African air quality guidelines.

8.4. Environmental management and mitigation measures proposed

Environmental management and mitigation measures have been proposed in Table 15 and will be unpacked in the draft environmental management plan

9. Draft Environmental Management Plan

The Draft EMP has been included as an Annexure to this document.

10. Assumptions, Uncertainties and Gaps in Knowledge

This report has been compiled based on the following assumptions, uncertainties and gaps in knowledge:

- a) The cumulative impact of air emissions, taking into account surrounding atmospheric emissions, such as those from roads, residential cooking and heating fires, Sonae Novobord and Eskom operations have not been taken into account. This would require a full scale impact assessment, which would place an undue burden on the client, and is not commensurate with the extent of operations. The Highveld Air Quality Priority Area Management Plan however, should be viewed as the strategic initiative with respect to the management of cumulative impacts in this air shed.
- b) The air quality study excluded impacts from fugitive dust emissions. Full mitigation however, during construction and operation is possible, and as such measures to mitigate dust have been included in the EMP. A dust monitoring program has also been included in the EMP.

- c) Due to noise generating equipment not being available on site to measure future noise levels, it is recommended that a study in this regard be executed during full operation and that the required engineering controls are instituted is required. Full mitigation of any noise impacts will be possible and as such it is recommended that environmental authorization not be declined based on the absence of this data
- d) No assessment of fauna and flora have been done, based on the disturbed nature of the sight, and the nature of the surrounding area, of which plantations and industrial use are the predominant land uses.

11. Environmental Impact Statement and Recommendations by the EAP

With adequate mitigation and management measures in place, the project can be expected to have a low negative impact during the construction phase on surrounding social and natural environment.

The project will furthermore have a positive impact on the region in terms of job creation and economic stimulation during the construction phase. These positive impacts benefits can be maximised through preference in procurement processes for local firms and employment of local labourers where viable.

Once in operation, the proposed project will continue to impact in a positive way on the local job creation and therefore indirectly, on the local economy.

Based on the outcomes of the environmental impact assessments as contained in the relevant sections of this document, the overall negative impact of the project is of Medium Significance, which can be reduced to a Low Significance though the implementation of cost-effective mitigation measures that are fairly easy to implement, maintain and monitor.

Based on the aforementioned, the EAP makes the following recommendations:

- a) The project should be approved and allowed to proceed.
- b) The mitigation measures proposed in the impact assessment section have been incorporated into the EMP in more detail and must be implemented during the final planning of and construction as well as operational phases of the project
- c) A communications pathway must be established that would allow a designated person to deal with any concerns and complaints that may arise during construction and operation.
- d) Strict monitoring and enforcement of the conditions and requirements of the EMP must be undertaken by the developer to ensure that all contractors and operators adhere to the requirements and that the monitoring regime is followed without fail.

12. Details of the Public Participation Process Conducted

The Public Participation Process (PPP) for this project is conducted by Eon Consulting according to the guidelines as published in the Department of Environmental Affairs (2010), Public Participation 2010, Integrated Environmental Management Guideline Series 7, Department of Environmental Affairs, Pretoria, South Africa. This section of the document provides detail of the public participation process (PPP) undertaken up to this point in time. Note that the PPP is still in process.

12.1. Steps that were taken to notify potentially interested and affected parties of the proposed application

The following PPP was performed for the Busby Renewable Energy Plant:

- Potential I&APs were identified by review of the site and consultation with the client
- These potential I&APs were informed of the process and invited by letter to be registered I&APs. The letter was accompanied by additional basic information and a registration form
- A notice in the local newspaper, The Highveld Tribune, was printed in the 11 June 2013 edition, and informs the public of the public participation process
- Two site notices were displayed near the site.

12.2. Proof of notice boards, advertisements and notices

12.2.1. Notification to I&AP

The following I&APs and stakeholders were identified.

Table: 18. List of identified I&APs

Name	Designation	Contact Information	Delivery Method
Mr Johann Ernst	Landowner	017 631 5411 jernst@lantic.net	By Hand
Mr H Gerken	Neighbour	082 892 8696	By Hand
Mr H Filter	Neighbour	082 900 5916	By Hand
Mr Peter Viljoen	Neighbour : Sonae Novabord	Panbult Office: 017 820 8000 Head Office: 011 236 1400	By Hand

Name	Designation	Contact Information	Delivery Method
Mr. T.D Hlanyane	Gert Sibande District Municipality Senior Manager in Municipal Health and Environmental Services. (Air Quality & Waste Officer)	017 734 6100 Dan.hlanyane@gsibande.gov.za	Email preceded by a telephone conversation (will be followed up with a hand delivery if no response is received)
Mr Vusi Dube	Mkhondo Local Municipality: Senior Manager : Forestry, Parks ,Solid Waste (local municipality)	017 826 8100 Vusi.dube@gmail.com	Email preceded by a telephone conversation (will be followed up with a hand delivery if no response is received)
Mr Dlamini	Msukaligwe Local Municipality Municipal Manager (adjacent municipality)	017 801 3504 mingwenya@ msukaligwa.gov.za	Email preceded by a telephone conversation (will be followed up with a hand delivery if no response is received)
Mrs. Thembisile Nkosi	Ward Councillor: Mkhondo Local Municipality: Ward 4	073 462 4672 gtmetk@webmail.co.za	Email preceded by a telephone conversation (will be followed up with a hand delivery if no response is received)
Mr Fritz Ernst	Farmers/Agricultural union	082 786 7886	By Hand

The landowner and neighbours received hand delivered letters accompanied by a printed copy of the Basic Information Document (BID) and a registration form.

A copy of a typical letter and registration form are shown below.

The signed section of the returned copy of the letter for each recipient will be included in the final BAR.



Received by (Name)

Signature.....

Date.....

Building 25, Thornhill Office Park
Bekker Road, Vorna Valley, South Africa

POSTAL ADDRESS
PO Box 12389, Vorna Valley
Midrand, 1686, South Africa

T +27 (0)11 564 2300
F +27(0)86 677 3558

info@eon.co.za
www.eonconsulting.co.za

Ref Number: Mpumalanga DEDET 17/2/3 GS-158

To: Sonae Novabord
Attention : Mr P Viljoen

11 June 2013

**NOTICE OF ENVIRONMENTAL BASIC ASSESSMENT PROCESS -PUBLIC PARTICIPATION PROCESS :
BUSBY RENEWABLE ENERGY PROJECT**

Notice is hereby given to you in terms of the Environmental Impact Assessment Regulations (R543 of 18 June 2010) of the intentions of Busby Renewables (Pty) Ltd (a joint venture between Famsecure Carbon (Pty) Ltd and J&J Timbers (Pty) Ltd) and that the public participation has commenced and you are invited to participate in the process.

The proposed activity for which an environmental authorisation is required will take place at the site of Busby Sawmill, located on Portion 5 of Farm Valschlei 352 IT along the N2 approximately 55 kilometers south-east of Ermelo and 45 km north-west of Piet Retief, Mpumalanga.

An application has been lodged with and registered (Ref. No.: 17/2/3 GS-158) by Mpumalanga Department of Economic Development, Environment and Tourism to fulfill the requirements associated with the Basic Assessment Process R543 for a Listed Activity as set out in Listing Notice 1 of Regulation No R544 of the of the Environmental Impact Assessment Regulations as Promulgated under Sections 24 and 24D of the National Environmental Management Act (Act No. 107 of 1998). The project will be registered under the Clean Development Mechanism.

EON Consulting was appointed as the independent environmental practitioners to compile and submit the application for an environmental authorization and manage the associated processes as described by the regulations.

Attached please find your copy of this letter, a background information document and a stakeholder registration form in respect of the application. A copy of the draft Basic Assessment Report will be placed in the near future at the Busby Sawmill office.

Eon Consulting would like to inform you, that you can participate in the public participation process by registering as an Interested and Affected Party (I&AP). By registering as an I&AP, you will be able to register your comments on the proposed application for an environmental authorisation or request further information. If you wish to register as an I&AP, please do so in writing before 12 July 2013.

Yours Faithfully,



Adri Venter
Principal Consultant
EON CONSULTING
Contact Details: EON Consulting, Ms Adri Venter
E-Mail: adri.venter@eon.co.za; Phone: +27 (0)11 564 2300 Fax: +27 (0)82 372 8186

ENABLING
BUSINESS
TO SUCCEED

Directors: J Naidoo, C Jardine, E Phala, W Terblanche, R Thomas, E du Toit, R Dhawan Reg No: 1998/008977/07

Figure 29: Copy of typical hand delivered letter to I&AP

<p>ENVIRONMENTAL BASIC ASSESSMENT PROCESS FOR THE PROPOSED CONSTRUCTION OF FACILITIES FOR THE GENERATION OF 12.5MW OF RENEWABLE ENERGY, SITUATED ON FARM VALSCHVLEI 352 IT, PROTION 5, MKHONDO LOCAL MUNICIPALITY, MPUMALANGA PROVINCE</p> <p>REGISTRATION AND COMMENT SHEET – 11 June 2013</p> <p>Ref Number: Mpumalanga DEDET 17/2/3 GS-158</p>					
<p>Title _____ Name _____</p> <p>Surname _____</p> <p>Company Name / Interest _____</p> <p>_____</p> <p>Postal or Residential Address _____</p> <p>_____</p> <p>Area _____</p> <p>Postal Code _____</p> <p>Tel () _____</p> <p>Mobile _____</p> <p>Fax () _____</p> <p>Email address _____</p> <p>Please mark with an X to indicate whether you would like to participate in this Environmental Assessment process:</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="padding: 2px;">Yes, I would like to participate in this process</td> <td style="text-align: center; padding: 2px;">YES</td> </tr> <tr> <td style="padding: 2px;">No, I am not interested in participating</td> <td style="text-align: center; padding: 2px;">NO</td> </tr> </table> <p>COMMENTS (You are welcome to attach separate sheets)</p> <p>The following issues must be considered by the Environmental Basic Assessment process:</p> <p>_____</p> <p>_____</p> <p>_____</p> <p>_____</p> <p>_____</p> <p>_____</p> <p>_____</p> <p>_____</p> <p>_____</p> <p>_____</p>	Yes, I would like to participate in this process	YES	No, I am not interested in participating	NO	<p>_____</p> <p>_____</p> <p>_____</p> <p>_____</p> <p>_____</p> <p>_____</p> <p>_____</p> <p>_____</p> <p>_____</p> <p>_____</p> <p>Please provide details of any of your friends/colleagues whom you would like us to add to our mailing list:</p> <p>Title _____ Name _____</p> <p>Surname _____</p> <p>Company name _____</p> <p>_____</p> <p>Tel () _____</p> <p>Fax () _____</p> <div style="border: 1px solid black; padding: 10px; margin-top: 10px;"> <p style="text-align: center;">Please complete & return to EON Consulting:</p> <p style="text-align: center;">Ms. Adri Venter EON Consulting P.O. Box 12389 Vorna Valley</p> <p style="text-align: center;">Tel: +27 564 2300 Fax: +27 86 677 3558 Email: adri.venter@eon.co.za</p> </div> <p style="text-align: center; margin-top: 10px;">Thank you for your participation.</p> <p style="text-align: center;">Please be assured that your comments will form part of the final document to be submitted to the decision making authority.</p>
Yes, I would like to participate in this process	YES				
No, I am not interested in participating	NO				

Figure 30: Copy of Registration form

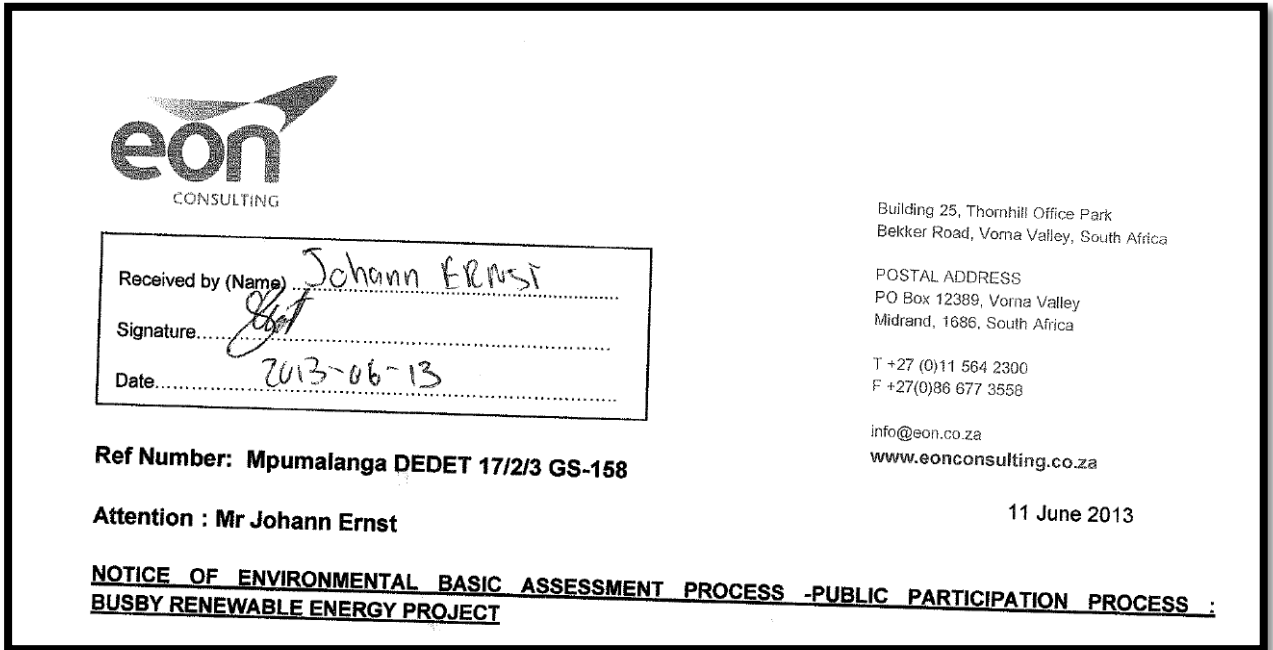


Figure 31: Signed copies of letters

This section will be updated in the final BAR once all the signed copies have been consolidated.

The municipal parties were contacted telephonically and it was agreed that they prefer to be e-mailed. Emails were sent which included a personal letter, Basic Information Document and registration form as attachments. If no reply is received as requested, the documents will be delivered by hand. Copies of the confirmation emails (or then signed hand delivery notices) will be included in the final BAR.



Figure 32: Copy of Email PPP Notification to Mr Hlanyane

From: Renee Penman
To: ["gtmetki@webmail.co.za"](mailto:gtmetki@webmail.co.za)
Cc: [Adri Venter](#)
Subject: Busby Renewables: Public Participation Notification
Date: 12 June 2013 01:09:00 PM
Attachments: [Busby BID10June rev 1.0.pdf](#)
[Registration Form Busby Rev 1.0.pdf](#)
[Letter to I&AP rev 1.0 Ms. Nkosi.pdf](#)

Good Afternoon Ms Nkosi

Eon Consulting would like to inform you as Ward Councillor for Ward 4 of the Mkhondo Municipality, of the commencement of the Public Participation Process for the proposed Busby Renewable Energy Project in your area.

Please find attached your notification letter and a copy of the Basic Information Document and a registration form.

Please confirm that you have received this email.

Regards

Renée Penman
Principal Consultant

EON CONSULTING
www.eonconsulting.co.za
T +27 (0)11 564 2300 (x2313)
F +27 (0)86 675 0182
M +27 (0)83 637 9923



This email and its contents are subject to the Eon Consulting Disclaimer, which can be viewed at <http://www.eon.co.za/disclaimer.htm>

Figure 33: Copy of Email PPP Notification Mrs Nkosi

From: Renee Penman
Sent: 13 June 2013 10:22 AM
To: 'vusi.dube@gmail.com'
Cc: Adri Venter
Subject: Busby Renewables: Public Participation Notification
Attachments: Letter to I&AP rev 1.0 Mr Dube.pdf; Busby BID10June rev 1.0.pdf; Registration Form Busby Rev 1.0.pdf

Good Morning Mr Dube

Eon Consulting would like to inform the Environmental Services of the Mkhondo Local Municipality, of the commencement of the Public Participation Process for the proposed Busby Renewable Energy Project.

Please find attached your notification letter and a copy of the Basic Information Document and a registration form.

Please confirm that you have received this email.

Regards

Renée Penman

Principal Consultant

EON CONSULTING
www.eonconsulting.co.za
T +27 (0)11 564 2300 (x2313)
F +27 (0)86 675 0182
M +27 (0)83 637 9923



This email and its contents are subject to the Eon Consulting Disclaimer, which can be viewed at <http://www.eon.co.za/disclaimer.htm>

Figure 34: Copy of Email PPP Notification Mrs Nkosi

From: Renee Penman
Sent: 13 June 2013 11:50 AM
To: 'mingwenya@msukaligwa.gov.za'
Cc: Adri Venter
Subject: Busby Renewables: Public Participation Notification
Attachments: Letter to I&AP rev 1.0 Mr Dlamini.pdf; Busby BID10June rev 1.0.pdf; Registration Form Busby Rev 1.0.pdf

Good Morning Mr Dlamini

Eon Consulting would like to inform the Municipal Manager's Office of the Msukaligwa Municipality, of the commencement of the Public Participation Process for the proposed Busby Renewable Energy Project.

This proposed project is to be located in the Mkhondo Municipality and adjacent to the Msukaligwa Municipality.

Please find attached your notification letter and a copy of the Basic Information Document and a registration form.

Please confirm receipt of this email.

Regards

Renée Penman

Principal Consultant

EON CONSULTING

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T +27 (0)11 584 2300 (x2313)

F +27 (0)86 675 0182

M +27 (0)83 637 9923



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Figure 35: Copy of Email PPP Notification to Mr Dlamini

12.2.2. Notice in the newspaper

A notice of the PPP was printed in the local newspaper, The Highveld Tribune on the 11 June 2013.

A copy of the notice and photo of the publication is shown below:

**NOTICE OF ENVIRONMENTAL BASIC ASSESSMENT PROCESS -
PUBLIC PARTICIPATION PROCESS**

In terms of the:
National Environmental Management Act, Act 107 of 1998 (NEMA) and associated EIA regulations and listed activities.
National Water Act, Act 36 of 1998 (NWA).

Mpumalanga DEDET: Ref No: 17/2/3 GS-158

**PROPOSED CONSTRUCTION OF FACILITIES FOR THE GENERATION OF
12.5 MW OF RENEWABLE ENERGY, SITUATED ON PORTION 5 OF THE FARM
VALSCHVLEI 352 IT, MKHONDO LOCAL MUNICIPALITY,
MPUMALANGA PROVINCE**

PROJECT NAME: Busby Renewables

APPLICANT: Farmsecure Energy

LOCATION AND SIZE: The facilities will be erected on the current footprint of the existing Busby Sawmill in the area of Amsterdam/Ermelo, situated on Portion 5 of the Farm Valschvlei 352 IT, Mkhondo Local Municipality, Mpumalanga Province. The site is approximately 55 kilometres south-east of Ermelo and 45 kilometres north-west of Piet Retief.

PROPOSED ACTIVITY: The project will aim to construct facilities for the generation of 12.5 MW of electricity for the national grid and steam for the sawmill. Sawmill and plantation residue will be used as biofuel to generate green energy. The project will be developed in two phases. During phase 1, facilities will be constructed to initially generate less than 10 MW of electricity. The facilities will be expanded in phase 2 to generate 12.5 MW of electricity.
The project has been registered with the Department of Economic Development, Environment and Tourism (Ref. No.: 17/2/3 GS-158).

APPLICATION FOR ENVIRONMENTAL AUTHORISATION TO UNDERTAKE THE FOLLOWING EIA ACTIVITIES:
In terms of sections 24 and 24D of the National Environmental Management Act, Act 107 of 1998 (NEMA), as read with the EIA Regulations of GN R543 of 18 June 2010, a Basic Assessment Application is required to be undertaken for the proposed project. The following listed activities are triggered by the proposed development: Listing Notice (LN) 1: Activity 56 with reference to Activity 1. Government Notice (GN) No. R544 refers. In addition the project will also be undertaken in terms of the National Water Act, Act 36 of 1998 (NWA). The project will be registered under the Clean Development Mechanism.

INDEPENDENT ENVIRONMENTAL CONSULTANT: EON Consulting (Pty) Ltd

DATE OF ADVERTISEMENT: 11 June 2013

INVITATION TO PARTICIPATE: Should you require any additional information or wish to register as an I&AP and/or inform us of any other I&APs who should be notified, please submit your name, contact information, and interest in the matter in writing to the address below by not later than 12 July 2013.

EON Consulting: **Adri Venter**,
P.O. Box 12389, Vorna Valley
Fax: +27 86 677 3558
Tel: +27 564 2300
Mail: adri.venter@eon.co.za
More information may be found at www.eon.co.za under *Public Participation*.

Figure 36: Copy of Print Notice

Vacancies / Notices

MPUMALANGA GAMBLING ACT, 1995(Act 5 of 1995) as amended APPLICATION FOR AN AMENDMENT /REMOVAL TO A BINGO LICENCE

Notice is hereby given that Viva Bingo (Middelburg) Pty Ltd (Reg 2002/020 177/07), intends submitting an application to the Mpumalanga Gambling Board for An amendment /removal to its Bingo Operators Licence to amend its licence conditions and removal of its premises and re-locate to 13 Murray Street, Ermelo. The application will be open for public inspection at the offices of the Board from 14th June 2013.

Attention is directed to the provisions of section 26 of the Mpumalanga Gambling Act, 1995 (Act No 5 of 1995), as amended, which makes provision for the lodging of written representation in respect of the application.

Such representations should be lodged with the Chief Executive Officer, Mpumalanga Gambling Board, First Avenue (Private Bag X9908), White River, South Africa, 1240 within 30 days from 14th June 2013.

Camden Young Professionals making a difference

This is the second initiative from the Camden Young Professionals that involves making a difference in the Ermelo community. Firstly it was the school shoes and now the blankets. This initiative came up because Ermelo is known for its freezing winters. Previously Young Professionals served soup during winter to the kids in the streets, but this year they decided to change their strategy of providing warmth from soup to blankets.

This initiative was targeted at mostly families without income or child/granny headed families. YP's fundraised at the

Power Station by selling cakes to employees. The employees really supported them because they knew what YP's were trying to achieve. Managers were also asked to donate blankets and the response was good as well.

A total of 24 warm blankets, 10 bags of groceries and 10 bags of variety of vegetables were donated. The Power Station Manager, Anthony Kuzelj, donated a few more items from his pocket to some of the families.

A total of 12 families from Ermelo and surroundings benefited from the YP's

2013 winter initiative. The families were identified by the SASSA's officials from the local office. The Camden YP Chairperson, Promise Hlubi, would like to thank Eskom Camden employees for supporting the YP initiatives. She further expressed her concern that most of the families that were visited by YP's did not have proper documentation for them to receive government grants. "It is so sad when one is confronted with such situations from our own community, we know we can't help everyone, but if we can all try and assist where we can, we can make a difference", Promise Hlubi said. MS

VAKATURE

24 Motors benodig tans 'n Motor Onderdele Klerk

Minstens 7 jaar ondervinding is 'n vereiste.

Salaris Onderhandelbaar

FAKS CV NA: 017 819 1302



The Camden Young Professionals who donated blankets to families without any income.

Vacancies / Notices

NOTICE OF ENVIRONMENTAL BASIC ASSESSMENT PROCESS - PUBLIC PARTICIPATION PROCESS

In terms of the National Environmental Management Act, Act 107 of 1989 (NEMA) and associated EIA regulations and listed activities National Water Act, Act 36 of 1998 (NWA).

Mpumalanga DEDET: Ref No: 17/2/3 GS-158

PROPOSED CONSTRUCTION OF FACILITIES FOR THE GENERATION OF 12.5 MW OF RENEWABLE ENERGY, SITUATED ON PORTION 5 OF THE FARM VALSCHVLEI 352 IT, MKHONDO LOCAL MUNICIPALITY, MPUMALANGA PROVINCE

PROJECT NAME: Busby Renewables

APPLICANT: Farnocore Energy

LOCATION AND SIZE: The facilities will be erected on the current footprint of the existing Busby Sawmill in the area of Amantsoane/Ermelo, situated on Portion 5 of the Farm Valschvlei 352 IT, Mkhondo Local Municipality, Mpumalanga Province. The site is approximately 55 kilometres south-east of Ermelo and 45 kilometres north-west of Piet Retief.

PROPOSED ACTIVITY: The project will aim to construct facilities for the generation of 12.5 MW of electricity for the national grid and steam for the sawmill. Sawmill and plantation residue will be used as fuel to generate green energy. The project will be developed in two phases. During phase 1, facilities will be constructed to initially generate less than 10 MW of electricity. The facilities will be expanded in phase 2 to generate 12.5 MW of electricity.

The project has been registered with the Department of Economic Development, Environment and Tourism (Ref. No: 17/2/3 GS-158).

APPLICATION FOR ENVIRONMENTAL AUTHORISATION TO UNDERTAKE THE FOLLOWING ESA ACTIVITIES:

In terms of sections 24 and 24C of the National Environmental Management Act, Act 107 of 1989 (NEMA), as read with the EIA Regulations of GN 1943 of 16 June 2010, a Basic Assessment Application is required to be undertaken for the proposed project. The following listed activities are triggered by the proposed development: Listing Notice (LN) 1: Activity 56 with reference to Activity 1 Government Notice (GN) No. R544 refers. In addition the project will also be undertaken in terms of the National Water Act, Act 36 of 1998 (NWA). The project will be registered under the Clean Development Mechanism.

INDEPENDENT ENVIRONMENTAL CONSULTANT: EON Consulting (Pty) Ltd

DATE OF ADVERTISEMENT: 11 June 2013

INVITATION TO PARTICIPATE: Should you require any additional information or wish to register as an I&AP and/or inform us of any other I&APs who should be notified, please submit your name, contact information, and stamped in writing to the address below by not later than 12 July 2013.

EON Consulting: Adm. Venue

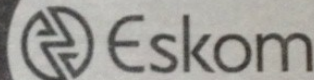
P.O. Box 12284, Johannesburg

Fax: +27 11 577 1598

Tel: +27 11 412 238

Web: www.eon.co.za

More information may be found at www.eon.co.za/under-Public-Participation



INVITATION TO TENDER CIVIL MAINTENANCE TENDER

Camden Power Station invites Suppliers / Contractors that provides Civil Maintenance Services to tender. The duration of the contract is 36 months.

Suppliers / Contractors that have or can lease the following equipment are requested to attend a site meeting on 20 June 2013 at Camden Power Station.

The time of the meeting is 10:00 - 12:00. Please visit Eskom Tender Bulletin for contract document.

- Cherry Picker
- A fully equipped plumber van, to be parked on site. Should be fully equipped with ladders, tools, plungers, etc.
- Must be able to store or have certain amount of paint which is SABS compliant.
- 5 000L mobile vacuum truck / Documents for sub contracting.

Please note that:

The tender is set aside for Exemplified Micro Enterprises (EME's) that are more than 50% black owned and Qualifying Small Enterprises (QSE's) that are more than 50% black owned with BBEEE grading level of 1 - 3. The suppliers should be based in Mpumalanga Province. The proof of business address will form part of the tender returnable. Companies that do not achieve above stated requirements will be deemed commercially non-responsive. A valid certificate from SANAS accredited verification agency or letter from Auditors/Accountants for EME's will be required to validate the black ownership contribution level of companies. CIDB requirements will be grade level 4PE.

Companies are encouraged to form Partnerships Suppliers are required to wear PPE for site visit.

For more clarification please contact the Procurement Manager at 017 827 8150 or on E-mail: Waldina.malebana@eskom.co.za

Figure 37: Printed notice in the 11 June 2013 edition of The Highveld Tribune

12.2.3. Notice Boards: Two notice boards were displayed the vicinity of the plant:

- *Notice Board 1:* On the gate of Busby Sawmill
- *Notice Board 2:* At the intersection of the N2 between Ermelo and Piet Retief and the road to Driefontein.

These were on display from the 11 June 2013.

A copy of the notice, a location map and site photos are included below:

<p>NOTICE OF ENVIRONMENTAL BASIC ASSESSMENT PROCESS - PUBLIC PARTICIPATION PROCESS</p> <p>In terms of the: National Environmental Management Act, Act 107 of 1998 (NEMA) and associated EIA regulations and listed activities. National Water Act, Act 36 of 1998 (NWA).</p> <p>Mpumalanga DEDET: Ref No: 17/2/3 GS-158</p>
<p>PROPOSED CONSTRUCTION OF FACILITIES FOR THE GENERATION OF 12.5 MW OF RENEWABLE ENERGY, SITUATED ON PORTION 5 OF THE FARM VALSCHVLEI 352 IT, MKHONDO LOCAL MUNICIPALITY, MPUMALANGA PROVINCE</p>
<p><i>PROJECT NAME:</i> Busby Renewables</p> <p><i>APPLICANT:</i> Farmsecure Energy</p> <p><i>LOCATION AND SIZE:</i> The facilities will be erected on the current footprint of the existing Busby Sawmill in the area of Amsterdam/Ermelo, situated on Portion 5 of the Farm Valschvlei 352 IT, Mkhondo Local Municipality, Mpumalanga Province. The site is approximately 55 kilometres south-east of Ermelo and 45 kilometres north-west of Piet Retief.</p> <p><i>PROPOSED ACTIVITY:</i> The project will aim to construct facilities for the generation of 12.5 MW of electricity for the national grid and steam for the sawmill. Sawmill and plantation residue will be used as biofuel to generate green energy. The project will be developed in two phases. During phase 1, facilities will be constructed to initially generate less than 10 MW of electricity. The facilities will be expanded in phase 2 to generate 12.5 MW of electricity.</p> <p>The project has been registered with the Department of Economic Development, Environment and Tourism (Ref. No.: 17/2/3 GS-158).</p> <p>APPLICATION FOR ENVIRONMENTAL AUTHORISATION TO UNDERTAKE THE FOLLOWING EIA ACTIVITIES:</p> <p>In terms of sections 24 and 24D of the National Environmental Management Act, Act 107 of 1998 (NEMA), as read with the EIA Regulations of GN R543 of 18 June 2010, a Basic Assessment Application is required to be undertaken for the proposed project. The following listed activities are triggered by the proposed development: Listing Notice (LN) 1: Activity 56 with reference to Activity 1. Government Notice (GN) No. R544 refers. In addition the project will also be undertaken in terms of the National Water Act, Act 36 of 1998 (NWA). The project will be registered under the Clean Development Mechanism.</p> <p>INDEPENDENT ENVIRONMENTAL CONSULTANT: EON Consulting (Pty) Ltd</p> <p>INVITATION TO PARTICIPATE: Should you require any additional information or wish to register as an I&AP and/or inform us of any other I&APs who should be notified, please submit your name, contact information, and interest in the matter in writing to the address below by not later than 12 July 2013.</p> <p>EON Consulting: Adri Venter, P.O. Box 12389, Vorna Valley Fax: +27 86 677 3558 Tel: +27 564 2300 Mail: adri.venter@eon.co.za More information may be found at www.eon.co.za under <i>Public Participation</i></p>

Figure 38: Copy of Site Notice



Figure 39: Map showing location of notice boards



Figure 40: Notice Board 1– close up



Figure 41: Notice Board 1– showing orientation



Figure 42: Notice Board 2: Close up



Figure 43: Notice Board 2: Orientation

12.3. Registration of I&APs and Comments

This section will be updated once registration from I&APs and comments have been received and consolidated. The Public Participation Process is in progress.

13. Representations, and Comments Received in Connection with the Application or the Basic Assessment Report

This is a draft revision of Basic Assessment Report, and is prepared while the Public Participation is in progress. This section will be updated once the Public Participation is complete.

The following may be included in the updated revision:

- The minutes of any meetings held by the EAP with interested and affected parties and other role players which record the views of the participants
- Any responses by the EAP to those representations, comments and views
- Any specific information required by the competent authority
- Any other matters required in terms of sections 24(4)(a) and (b) of the Act.

APPENDIX 1:
Letter from Worley Parsons and
Response from DEA



WorleyParsons

resources & energy

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10 September 2012

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0001

ENVIRONMENTAL AUTHORISATIONS CONFIRMATION FOR BUSBY RENEWABLES

1. BACKGROUND

Farmsecure Carbon (Pty) Ltd. is in the process of investigating the possibility of establishing a biomass co-generation project which will be integrated with the existing sawmill activity at J&J Timbers. The site is located between Ermelo and Piet Retief on the N2 (Locality Map is Attached as **Appendix A**). J&J Sawmills in partnership with Farmsecure Carbon (Pty) Ltd. will establish the Busby Renewable project.

WorleyParsons RSA was appointed to determine the legal process requirements, with regards to conducting an Environmental Impact Assessment, for the proposed plant in terms of the National Environmental Management Act, 1998 (Act 107 of 1998), the Environmental Management: Waste Act, 2008, (Act 59 of 2008) and the Environmental Management: Air Quality Act, 2004 (Act 39 of 2004). Below is a description of the activities and relevant legislated requirements.

2. TECHNOLOGY DESCRIPTION

The selected technology for the Busby Renewable project is a conventional steam Rankine cycle with dry/air cooling. The energy generated from the direct combustion of biomass is transferred to hot water in a pressurized boiler system. The water undergoes phase change in an evaporator and is superheated. The superheated steam is expanded through a turbine where pressure and volume change is converted to shaft work. The shaft work generates electricity at a predetermined voltage, which is in turn supplied to the existing grid and electricity distribution network.

The installed capacity of the plant is 10 MW (refer to MEB Y**Appendix B**), the captive power used by the plant is 1.19MW (refer to MEB Z**Appendix B**), and the output from the plant to the grid is 8.81 MW (refer to MEB AA**Appendix B**). In the industry, the standard lifetime of the equipment is 20 years. A block Flow Diagram is attached as **Appendix C**.

The power generation facility can be divided into the following main sections:



2.1. Combustion

The biomass is converted to thermal energy through direct combustion in a furnace. The proposed combustion technology is a water cooled vibrating grate system that ensures sufficient residence time for complete conversion and introduces air at different temperature and locations through the grate.

Air will be pre-heated by the flue gas after heat recovery steam generation and used for combustion and partially for drying the fuel. The air to fuel ratio will be adapted according to the specific moisture content and biomass quality.

2.2. Heat recovery steam generation (HRSG)

The thermal energy in the hot flue gas is carried over to hot water in a pressurized boiler system. The boiler feed water is treated to maintain the levels of dissolved solids and composition according to the boiler pressure and design specifications. Feedwater will be de-aerated with bleed steam from the turbine/boiler blowdown to control the level of dissolved oxygen. Flue gas after the steam generator is used to heat the boiler feed water in an economizer to maximize energy recovery. The water is then evaporated and superheated at low, medium and high pressure.

2.3. Electricity generation

Superheated steam from the HRSG unit is expanded in a turbine and the pressure and volume change is converted to shaft work. The selected turbine technology is of full condensing type. The condensing turbine is a technology preferred for power generation to maximise electrical output.

Process steam, currently used in the drying process of timber, will be supplied at a rate of 8 ton/h and pressure of 6 Bar(g). The method of steam supply will be blowdown from the boiler drum. The process steam will be condensed and recovered back as boiler feedwater to the HRSG unit. The steam used completely for power generation will be condensed in a vacuum condenser to maximise electricity production. The cooling method will be dry cooling and heat dissipated with air coolers, condenser temperature approaching the air dry bulb temperature.

2.4. Flue Gas treatment

The flue gas will be treated according to the air emission regulations applicable to the scale of the project and local environmental laws. Flue gas after economizer and air pre-heaters will be passed through a cyclone filter to remove particulates, dust and unburnt organic carbon. The flue gas efflux velocity at MCR shall not be less than 15 m/s and gas velocity up the body of the stack shall not exceed 8 m/s. The top of the exhaust stack shall be at a height above the highest point of the plant according to local regulations. The stack shall be self supporting. Stack construction and materials shall be selected to be suitable for the design life without maintenance considering the flue gas cleaning technology.



2.5. Water treatment

Fresh water will be supplied to the plant from the boreholes on site. Make-up water will be required for boiler blow down losses to control the level of total dissolved solids. Other losses in the cycle will occur through de-aeration, vent losses and turbine gland leakages.

The water treatment technology and chemical requirements will be selected according to the quality of the water supply and design specifications from the boiler supplier.

2.6. Mass and Energy Balances:

A simplified block flow diagram of the overall process is given in **Appendix C**. The stream ID is linked to the stream property data in the mass and energy balance table.

The mass and energy balances and costing is based on the following key parameters and process requirements:

- i. Boiler Pressure of 92 Bar(g) and 520°C superheated steam temperature;
- ii. Process steam demand of 8 that 6 Bar(g) saturated; and
- iii. Full condensing turbine generator set with air cooled condenser.

3. BIOMASS FUEL

The plant will utilize the following biomass:

Plantation residues from forestry operation. The main renewable biomass source for the project is plantation residues generated from forestry operations during harvesting, thinning and pruning operations. In the current practice, these residues are left to decay after harvesting or burnt in order to prevent fires in new or existing forest plantations.

Sawmill residues from the sawmill operation. Sawmill residues from the sawmill operations, consisting of wood chips and sawdust as well as off-cuts from the sawmill, will also be utilized by the project in small quantities. Currently this biomass source is burnt in low pressure steam boilers to generate steam utilised in the drying kilns.

The biomass will be will be sourced at a price from J&J Timber Suppliers.

4. WATER REQUIREMENTS

The proposed dry cooling technology will require approximately 120 m³ water on a daily basis. Water will be supplied to the plant from the existing boreholes on site. The dry cooling is a closed loop system and there will be no wastewater.

A Groundwater Potential and Existing Groundwater Abstraction Capacity study was conducted for the three existing boreholes situated on the property. The study concluded that Borehole 03 can sustain the project's water demand.



5. LEGISLATIVE REQUIREMENTS

To ensure that the project adheres to the relevant environmental legislation, namely the National Environmental Management Act, 1998 (Act 107 of 1998)(NEMA) and the National Environmental Management: Waste Act, 2008 (Act 59 of 2008)(NEMWA) and the National Environmental Management: Air Quality Act, 2004 (Act 39 of 2004) (AQA), the proposed activities were evaluated in terms of the listed activities for the respective Acts in order to determine whether an environmental authorisation and/ or licence is required.

5.1 National Environmental Management Act, 1998 (Act 107 of 1998)

The listed activities in terms of NEMA which could potentially be applicable are -

5.1.1. Regulation 544:

1.) The construction of facilities or infrastructure for the generation of electricity where -

- i. the electricity output is more than 10 megawatts but less than 20 megawatts; or***
- ii. the output is 10 megawatts or less but the total extent of the facility covers an area in excess of 1 hectare.***

The installed capacity of the plant is 9.98 MW (refer to MEB Y**Appendix B**), the captive power used by the plant is 1.19 MW (refer to MEB Z**Appendix B**), and the output from the plant to the grid is 8.79 MW (refer to MEB AA**Appendix B**). The footprint of the proposed plant will be less than the stipulated 1 ha (300m²) (see layout plan attached as **Appendix D**). The activity therefore falls below the stipulated threshold and the listed activity is not applicable.

9.)The construction of facilities or infrastructure exceeding 1 000 metres in length for the bulk transportation of water, sewage or storm water -

- i. with an internal diameter of 0,36 metres or more; or***
- ii. with a peak throughput of 120 litres per second or more,***

excluding where:

- a. such facilities or infrastructure are for bulk transportation of water, sewage or storm water or storm water drainage inside a road reserve; or***
- b. where such construction will occur within urban areas but further than 32 metres from a watercourse, measured from the edge of the watercourse.***

The proposed water abstraction will occur from the existing boreholes on the site. This activity is therefore not considered applicable.



10.) The construction of facilities or infrastructure for the transmission and distribution of electricity -

- i. outside urban areas or industrial complexes with a capacity of more than 33 but less than 275 kilovolts; or***
- ii. inside urban areas or industrial complexes with a capacity of 275 kilovolts or more.***

Although the project will connect to the national grid the proposed connection, due to the small size of the plant, will not exceed the 33 kV threshold. It is estimated that the transformer voltage ratio (LV/HV) will be 11/22 kV. The listed activity is therefore not considered to be applicable.

11.) The construction of:

- i. canals;***
- ii. channels;***
- iii. bridges;***
- iv. dams;***
- v. weirs;***
- vi. bulk storm water outlet structures;***
- vii. marinas***
- viii. jetties exceeding 50 square metres in size;***
- ix. slipways exceeding 50 square metres in size;***
- x. buildings exceeding 50 square metres in size; or***
- xi. infrastructure or structures covering 50 square metres or more;***

where such construction occurs within a watercourse or within 32 metres of a watercourse, measured from the edge of a watercourse, excluding where such construction will occur behind the development setback line.

The proposed water abstraction will occur from the existing boreholes on the site. This activity is therefore not considered applicable.

18.) the infilling or depositing of any material of more than 5 cubic metres into, or dredging, excavation, removal or moving of soil, sand, shells, shell grit, pebbles or rock from-

- i. a watercourse;***
- ii. the sea;***
- iii. the seashore;***
- iv. the littoral active zone, an estuary or a distance of 100 metres inland of the high-water mark of the sea or an estuary, whichever distance is the greater***

but excluding where such infilling, depositing, dredging, excavation, removal or moving -

- i. is for maintenance purposes undertaken in accordance with a management plan agreed to by the relevant environmental authority; or***
- ii. occurs behind the development setback line.***



The proposed water abstraction will occur from the existing boreholes on the site. This activity is therefore not considered applicable.

28). The expansion of or changes to existing facilities for any process or activity where such expansion or changes to will result in the need for a permit or license in terms of national or provincial legislation governing the release of emissions or pollution, excluding where the facility, process or activity is included in the list of waste management activities published in terms of section 19 of the National Environmental Management: Waste Act, 2008 (Act No. 59 of 2008) in which case that Act will apply.

The proposed activity will not require a permit with regards to the release of emissions or pollution as indicated above due to the nature of the design and size of the facility.

5.1.2 Regulation 545

26.)Commencing of an activity, which requires an atmospheric emission license in terms of section 21 of the National Environmental Management: Air Quality Act, 2004 (ActNo. 39 of 2004), except where such commencement requires basic assessment in terms of Notice of No. R544 of 2010.

Refer to Section 5.3 below.

5.1.3 Regulation 546

The proposed activity does not fall within the ambit of any of the areas or activities listed in Regulation 546 and therefore do not trigger any Environmental process.

5.2 National Environmental Management: Waste Act, 2008 (Act 59 of 2008)

The definition in NEM:WA of 'waste 'is the following:

"waste" means any substance, whether or not that substance can be reduced, re-used, recycled and recovered—

- a. **that is surplus, unwanted, rejected, discarded, abandoned or disposed of;**
- b. **which the generator has no further use of for the purposes of production;**
- c. **that must be treated or disposed of; or**
- d. **that is identified as a waste by the Minister by notice in the Gazette, and includes waste generated by the mining, medical or other sector, but—**
 - i. **a by-product is not considered waste; and**
 - ii. **any portion of waste, once re-used, recycled and recovered, ceases to be waste;**



The definition of 'by-product' on the other hand is as follows –

"by-product" means a substance that is produced as part of a process that is primarily intended to produce another substance or product and that has the characteristics of an equivalent virgin product or material;

Four criteria are used, by the Department of Environmental Affairs, in the determination of a by-product. These are:

1. The substance produced must be part of a process that is primarily intended to produce another substance or product.
2. The substance must demonstrate the equivalent chemical and physical characteristic as that of an equivalent virgin product or material. Equivalent virgin product in this case refers to the product that will be used as a raw material to produce a product or material.
3. The further use of the substance or object is certain
4. The substance or object can be used directly without any further processing.

In terms of the South African Criteria the following process specific characteristics are applicable:

1. The by-product from the plantation, generated from forestry operations (during harvesting, thinning and pruning), are seen as a product that is produced by all plantations in the process of wood production. The by-product is therefore not the main product but an essential product residue.
2. The wood product demonstrates equivalent characteristics as the equivalent virgin product. The process has been designed for plantations the use of wood products, therefore all wood products.
3. Should the plant be erected the future use of the product is certain. Wood by-products are used in several production processes as a primary virgin product.
4. The wood by-product will be fed directly into the kiln at the plant. Although drying of the product will take place, this will happen in the kiln and therefore simultaneously with the use of the product.

In terms of International Interpretation¹ for a product to be considered a by-product and not a waste the following criteria are applicable:

1. Is the further use of the material a certainty not a mere possibility.

If there is a possibility that the material is in fact not useable, does not meet the technical specifications that would be required for it to be useable, or there is no market for that material, then it should continue to be considered as a waste. Where a manufacturer can

¹Commission of the European Communities: Communication from the Commission to the Council and the European Parliament on the Interpretive Communication on waste and by-products.



sell the material concerned for a profit, this can indicate that it is more likely that such a material will certainly be used.

2. Can the material be used again without any further processing

Often, in the value chain of a by-product there is a chain of tasks that must be undertaken as part of the further use of the material: The material is produced, it may then be washed, dried, refined or homogenised, characteristics or other materials that are necessary for its further use may be added, its quality will be controlled and so on.

The Court has found that if an additional recovery process is required before further use, even if such subsequent use is certain, this is evidence that the material is a waste until the process has been completed.

3. As part of the continuing process of production

If the material is ready for a further use as an integral part of the continuing process of production, and is then effectively sent for such a further use, then it is a by-product.

In terms of the International Interpretation the following process specific characteristics are applicable:

1. Should the plant be erected the future use of the product is certain. Wood by-products are used in several production processes as a primary virgin product.
2. The wood by-product will be fed directly into the kiln at the plant. Although drying of the product will take place, this will happen in the kiln and therefore simultaneously with the use of the product.
3. The wood by-product produced by the sawmill forms an integral part of the production process of the sawmill as this is fed into the existing sawmill infrastructure for drying purposes. The plantation residues produced during the production cycle of the timber plantations forms part of the production of timber. This product will in future form part of the production of electricity process.

The surplus wood and plantation residues, according to the criteria by which a by-product is classified, can therefore be regarded as a by-product and not a waste.

The process will produce ash as a by-product. This will be used as fertilizer back to the plantations where the biomass originated. In the current practise plantation residues are burnt in order to prevent fires and the ash act as fertilizer for the new plantations. An agreement has been reached with the plantation to supply the ash back to them for fertilizer. Although general waste ash is generally not considered a by-product, in this case the biomass ash adheres to all the above criteria describing a by-product. Based on the criteria above the following is also applicable to the ash by-product:

1. The ash is produced during the electricity generation process and is therefore a product residue.



2. The ash product demonstrates equivalent characteristics as the equivalent virgin product used by the plantation, also ash. The ash is transported back to the plantation for their original use.
3. The future use is certain as the ash would have been used by the plantation as general practice. The need has already been established with Farmsecure.
4. The ash will not be treated as used as is and no further processing is required.

Therefore the operation is not regarded as a listed activity and NEMWA is not applicable.

5.3 National Environmental Management: Air Quality Act, 2004 (Act 39 of 2004).

In terms of Government Notice No. 248 of 31 March 2010 “**Solid biomass combustion installations**” is listed in Subcategory 1.3.

Description: Solid biomass fuel installations used primarily for steam raising or electricity generation.

Application: All installations with design capacity equal to or greater than 50MW heat input per unit, based on the lower calorific value of the fuel used.

Substance or mixture of substances		Plant Status	Mg/Nm ³ under normal conditions of 10% o ₂ , 273 Kelvin and 101.3kPa	Cleantech Estimates
Common Name	Chemical Symbol			
Particulate Matter	N/A	New	50	50
		Existing	100	
Sulphur Dioxide	SO ₂	New	500	250
		Existing	3500	
Oxides of Nitrogen	NO _x expressed as NO ₂	New	750	400
		Existing	1100	

The proposed co-generation plant will have a design capacity equal to **40MW** heat input per unit, based on the lower calorific value of the biomass fuel. Therefore we conclude that it is under the threshold of the listed activity and will thus not require an Air Emission License.



According to the technical proposal provided by DPCleantech (**Appendix E**) the estimated emissions are indicated in the far right column in the table above.

Conclusion

In view of the discussion above, we are of the opinion that the proposed project does not trigger the need to obtain a licence or environmental authorisation in terms of NEMA, NEMWA or AQA.

We kindly request that you provide us with confirmation that the above interpretation is correct and that the proposed activity will not require an Environmental Authorisation, Waste Management License or Air Quality License in terms of the above legislation.

Should you have any queries in this regard please do not hesitate to contact me.

Yours faithfully

Francois Humphries

WorleyParsonsRSA



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Mr Francois Humphries
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Fax no: 012 460 1336

PER FACSIMILE / MAIL

Dear Mr Humphries

QUERY: PROPOSED ESTABLISHMENT OF BUSBY RENEWABLES BIOMASS CO-GENERATION PROJECT, MPUMALANGA

The letter dated 10 September 2012, received by this Department on 13 September 2012 has reference.

Based on the information provided, the Department concurs with the findings of the letter that the establishment of the Busby Renewables co-generation facility does not trigger any listed activities in terms of GN R.544, GN R.545 or GN R.546 of 2010.

As such, an environmental authorisation is not required for the commencement of the activities as proposed. However, should any aspect of the proposed activities change in any way, said changes must be communicated to the Department in order to confirm this opinion.

Please note that this is not an environmental authorisation and even if the development does not trigger any listed activities in terms NEMA EIA Regulations August 2010, you are still bound to "Duty of Care" by section 28 of NEMA no 107 of 1998 (as amended).

Further enquiries or uncertainties regarding the above can be addressed to the Department.

Yours faithfully

Mr Mark Gordon
Chief Director: Integrated Environmental Authorisations
Department of Environmental Affairs
Letter signed by: Ms Fatima Rawjee
Designation: Acting Director: Integrated Environmental Authorisations
Date: 23/10/2012.

APPENDIX 2:

Air Quality Impact Assessment Study and Specialist Declaration Form



Busby Renewable Energy Project

Client: Eon Consulting

RHDHV Reference Number: I10.JNB.400005

Compiled by: Nicole Singh

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Glossary

Air quality	A measure of exposure to air which is not harmful to your health. Air quality is measured against health risk thresholds (levels) which are designed to protect ambient air quality. Various countries including South Africa have Air Quality Standards (legally binding health risk thresholds) which aim to protect human health due to exposure to pollutants within the living space.
Ambient air	The air of the surrounding environment
Baseline	The current and existing condition before any development or action.
Boundary layer	The layer directly influenced by a surface
Concentration	When a pollutant is measured in ambient air it is referred to as the concentration of that pollutant in air. Pollutant concentrations are measured in ambient air for various reasons, i.e. to determine whether concentrations are exceeding available health risk thresholds (air quality standards); to determine how different sources of pollution contribute to ambient air concentrations in an area; to validate dispersion modelling conducted for an area; to determine how pollutant concentrations fluctuate over time in an area; and to determine the areas with the highest pollution concentrations.
Emission	The rate at which a pollutant is emitted from a source of pollution.
Evaporation	The dissipation of water into invisible water vapour.
Front	A synoptic-scale swath of cloud and precipitation associated with a significant horizontal zonal temperature gradient. A front is warm when warm air replaces cold on the passage of the front; with a cold front cold air replaces warm air.
Fugitive dust	Dust generated from an open source and is not discharged to the atmosphere in a confined flow stream.
Inversion	An increase of atmospheric temperature with an increase in height.
Mesoscale	A spatial scale intermediate between small and synoptic scales of weather systems.
Mixing layer	The layer of air within which pollutants are mixed by turbulence. Mixing depth is the height of this layer from the earth's surface.
Particulate matter (PM)	<p>The collective name for fine solid or liquid particles added to the atmosphere by processes at the earth's surface and includes dust, smoke, soot, pollen and soil particles. Particulate matter is classified as a criteria pollutant, thus national air quality standards have been developed in order to protect the public from exposure to the inhalable fractions. PM can be principally characterised as discrete particles spanning several orders of magnitude in size, with inhalable particles falling into the following general size fractions:</p> <ul style="list-style-type: none">• PM10 (generally defined as all particles equal to and less than 10 microns in aerodynamic diameter; particles larger than this are not generally deposited in the lung);• PM2.5, also known as fine fraction particles (generally defined as those particles with an aerodynamic diameter of 2.5 microns or less) ;

- PM10-2.5, also known as coarse fraction particles (generally defined as those particles with an aerodynamic diameter greater than 2.5 microns, but equal to or less than a nominal 10 microns); and

Ultra fine particles generally defined as those less than 0.1 microns

Precipitation Ice particles or water droplets large enough to fall at least 100 m below the cloud base before evaporating.

Relative Humidity The vapour content of the air as a percentage of the vapour content needed to saturate air at the same temperature.

1. INTRODUCTION

Royal HaskoningDHV was appointed by Eon Consulting to undertake a Tier 1 assessment for the proposed expansion of a Biomass combustion plant located in Ermelo, Mpumalanga. The proposed expansion will increase the capacity of the plant from 10MW to 12.5MW. The current design capacity of the plant is 10 MW, of which 1.19 MW is used by the plant with an output of 8.81 MW to the grid. The plant also supplies 8 tons of steam to the Sawmill. The expansion will allow for a design capacity of 12.5 MW, of which 1.4 MW is utilised by the plant with an output of 11.1 MW to the grid.

The steam drum and boiler will be expanded to allow for a greater volume as well as increased heat transfer in order to supply the turbine steam demand. Additional turbines and generators will be installed in order to utilise the increased steam production.

As part of the air quality assessment for the proposed expansion, a baseline assessment was undertaken through a review of available meteorological data. A fatal flaw assessment using Screen3 model was carried out to determine the potential impacts from the proposed project.



Figure 1-1: Locality map of the Busby Renewable energy project.

1.1. Process Description

The existing technology at Busby Renewable Energy is a conventional Rankine cycle. The main renewable biomass source for the project is plantation residue generated from forestry operations such as harvesting, thinning and pruning. During the baseline situation these residue are either left to decay after harvesting or burnt in order to prevent fires in new or existing forest plantation. Additional biomass sources such as woodchips, sawdust and off-cuts from the Sawmill are utilised during combustion. The biomass quality, moisture content and calorific value will vary depending on seasonal and diurnal changes. In order to minimise the impacts of external factors, biomass will be reclaimed from the stockpile and fed from different hoppers into the combustion plant. The waste heat from the flue gas will be used to dry the biomass from 30% moisture on average.

Biomass is converted to thermal energy through direct combustion in a furnace. The proposed combustion technology is a cooling vibrating grate specifically designed for biomass that ensures sufficient residence time for complete conversion and introduces air at different temperatures and locations throughout the grate. The proposed boiler technology is a high temperature, high pressure boiler technology. Air will be preheated by the flue gas after heat recovery generation (HRSG) and used for combustion and partially for drying the fuel. The air to fuel ratio will be adapted according to the specific moisture content and biomass quality.

Thermal energy in the flue gas is carried over to hot water in a pressurised boiler system. The boiler feed water is treated to maintain the levels of dissolved solids and composition according to the boiler pressure and design specifications. Feedwater will be de-aerated with a bleed stream from the turbine/ boiler in order to control the level of dissolved oxygen. Flue gas after steam generation is used to heat the boiler feed water in an economizer to maximise the energy recovery. The water is then evaporated and superheated at low, medium and high pressures.

Superheated steam is expanded in a turbine and the pressure and volume change is converted to shaft work. The selected turbine technology is the extraction condensing type for maximum overall plant efficiency.

Process steam currently used in the drying process of timber will be supplied at a rate of 8 tons per hour and at a pressure of 6 bars (g). Steam will be extracted from the turbine. The processed steam is condensed and recovered back as boiler feedwater to the boiler drum. The steam is then used for power generation and condensed in a vacuum condenser to maximise electricity production. The cooling method employed is dry cooling in which the heat is dissipated.

The fly ash collector for the flue gas adopts an electrostatic precipitator (ESP). The flue gas accesses the ESP via the inlet hoods. The inlet hoods are equipped with gas distribution screens, made of perforated plates that are provided with mechanical rapping devices. The ESP casing is equipped with discharge electrodes (DE) and collecting electrodes (CE) which are arranged in parallel, thus forming gas passage. The DE is connected to the negative pole of a HV set. The collecting electrodes are positively poled and earthed. Due to the high field strength in the ambience of the DE they produce a corona- discharge whereby the gas is ionized. The gas ions adhere to the dust particles. Due to the influence of the electrical field the charged dust particles migrate to the CE forming a dust layer. Accumulated particulate matter is removed from the collection plates at the periodic intervals by rapping or hitting the plates with rappers. Heavy particles will fall to the base of the ESP system.

The ESP has the following characteristics:

- Low pressure loss;

- High efficiency of ash collecting > 99%
- Resistance to high temperature , about 3000 °C
- Low cost of maintenance

Fresh water will be supplied to the plant from boreholes. Water make up will be required for boiler blow down losses to control the level of total dissolved solids. Other losses in the cycle will occur through de-aeration vent losses and turbine gland leakages. The selected water treatment technology is the Continuous Electrode de-ionization system. The cooling water bleed, wastewater from the demineralization plant and blow down water will be diverted to the ash hopper for ash quenching, which allows for a Zero Liquid discharge plant.

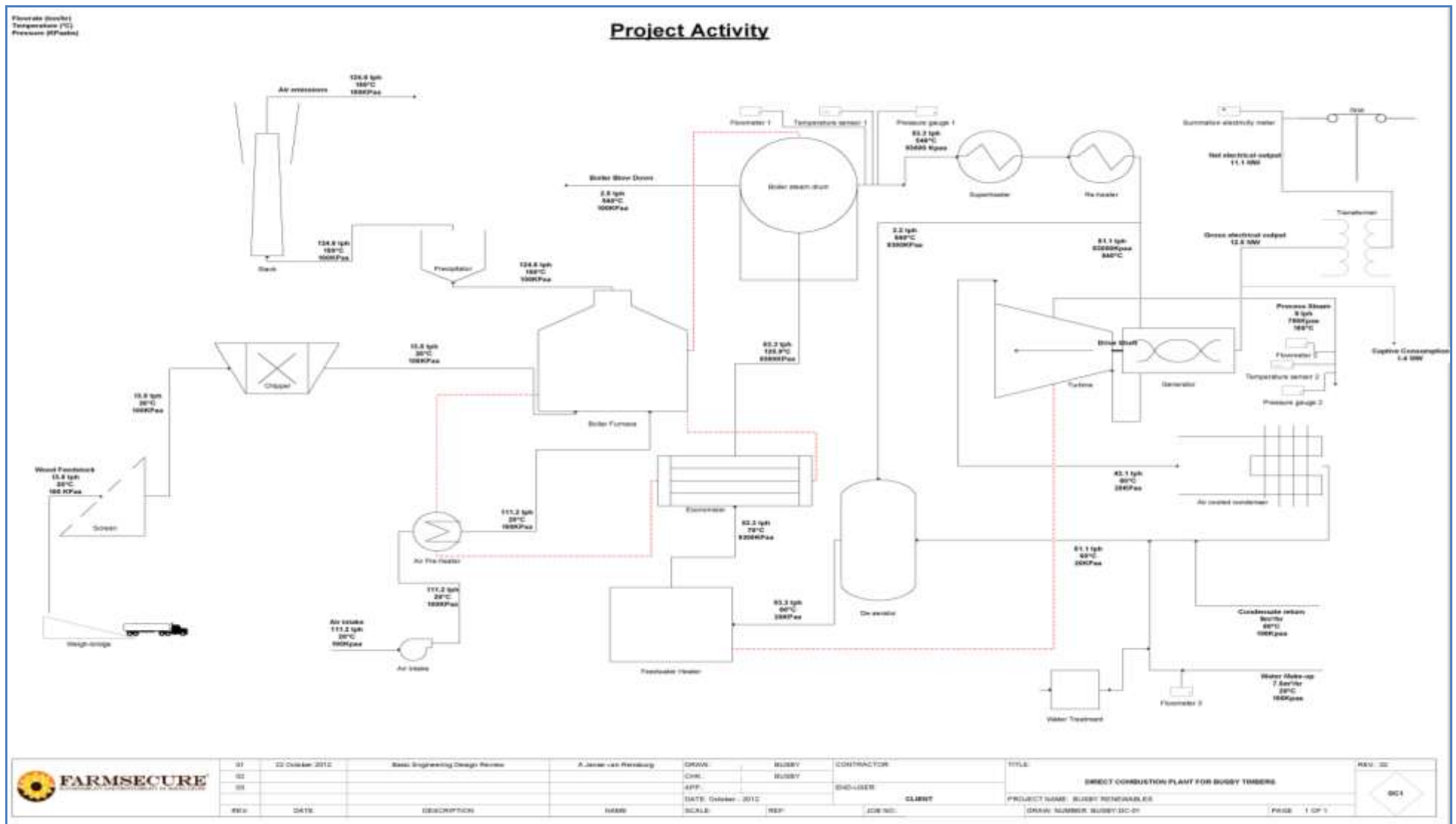


Figure 1-2: Process description of Busby Renewable energy.

1.2. Terms of Reference

The terms of reference for the Air Quality Impact Assessment for the proposed project can briefly be summarised as follows:

- **Baseline Assessment**
 - Provide an overview of the prevailing meteorological conditions in the area;
 - Review of applicable legislation and policies which are applicable to the proposed operations;
 - Identification of existing sources of emission and surrounding sensitive receptors, such as local communities, surrounding the plant;
- **Impact Assessment**
 - Screen3 model was used to determine the potential areas of impacts as a result of the proposed project.

1.3. Methodology

An overview of the methodological approach to be followed during this Tier 1 Air Quality Impact Assessment is outlined in the section which follows.

1.3.1. Baseline Assessment

During the baseline assessment, a qualitative approach was used to assess the baseline conditions in the project area. Local meteorological data was obtained from the South African Weather Services located in Ermelo for the period of Jan 2009 – Dec 2012. Applicable air quality legislation such as the National Environmental Management: Air Quality Act 39 of 2004 (GN163: 2005) and the Listed Activities and Associated Minimum Emission Standards (GN248: 2010) were reviewed. Existing sources of air pollution surrounding the biomass combustion plant were qualitatively assessed. Sensitive receptors, such as local communities, in close proximity to the plant were identified using satellite imagery.

1.3.2. Impact Assessment

Screen3 model was used to determine the potential areas of impact resulting from the proposed project. Screen3 model is a single source Gaussian plume model which provides maximum ground level concentrations for point, area, flare and volume sources as well as concentrations in the cavity zone and concentrations due to inversion break up and shoreline fumigation. The hourly maximum predicted concentrations will be compared to the applicable standards.

1.4. Report Structure

Section 1 of the report provides the background to the project. **Section 2** includes a meteorological overview of the region. **Section 3** provides a review of the applicable air quality legislation, existing sources of pollution and potential sensitive receptors. The fatal flaw assessment is discussed in **Section 4**. References are provided in **Section 5**.

2. Baseline Description of the Area

2.1. Meso-Scale Meteorology

The nature of the local climate will determine what will happen to particulates when released into the atmosphere (Tyson & Preston-Whyte, 2000). Concentration levels fluctuate daily and hourly, in response to changes in atmospheric stability and variations in mixing depth. Similarly, atmospheric circulation patterns will have an effect on the rate of transport and dispersion.

The release of atmospheric pollutants into a large volume of air results in the dilution of those pollutants. This is best achieved during conditions of free convection and when the mixing layer is deep (unstable atmospheric conditions). These conditions occur most frequently in summer during the daytime. This dilution effect can however be inhibited under stable atmospheric conditions in the boundary layer (shallow mixing layer). Most surface pollution is thus trapped under a surface inversion (Tyson & Preston-Whyte, 2000).

Inversion occurs under conditions of stability when a layer of warm air lies directly above a layer of cool air. This layer prevents a pollutant from diffusing freely upward, resulting in an increased pollutant concentration at or close to the earth's surface. Surface inversions develop under conditions of clear, calm and dry conditions and often occur at night and during winter (Tyson & Preston-Whyte, 2000). Radiative loss during the night results in the development of a cold layer of air close to the earth's surface. These surface inversions are however, usually destroyed as soon as the sun rises and warm the earth's surface. With the absence of surface inversions, the pollutants are able to diffuse freely upward; this upward motion may however be prevented by the presence of an elevated inversion (Tyson & Preston-Whyte, 2000).

Elevated inversions occur commonly in high pressure areas. Sinking air warms adiabatically to temperatures in excess of those in the mixed boundary layer. The interface between the upper, gently subsiding air is marked by an absolutely stable layer or an elevated subsidence inversion. This type of elevated inversions is most common over Southern Africa (Tyson & Preston-Whyte, 2000).

The climate and atmospheric dispersion potential of the interior of South Africa is determined by atmospheric conditions associated with the continental high pressure cell located over the interior. The continental high pressure present over the region in the winter months results in fine conditions with little rainfall and light winds with a northerly flow. Elevated inversions are common in such high pressure areas due to the subsidence of air. This reduces the mixing depth and suppresses the vertical dispersion of pollutants, causing increased pollutant concentrations (Tyson and Preston-Whyte, 2000).

Seasonal variations in the positions of the high pressure cells have an effect on atmospheric conditions over the region. For most of the year the tropical easterlies cause an air flow with a north-easterly to north-westerly component. In the winter months the high pressure cells move northward, displacing the tropical easterlies northward resulting in disruptions to the westerly circulation. The disruptions result in a succession of cold fronts over the area in winter with pronounced variations in wind direction, wind speeds, temperature, humidity, and surface pressure. Airflow ahead of a cold front passing over the area has a strong north-north-westerly to north-easterly component, with stable and generally cloud-free conditions. Once the front has passed, the airflow is reflected as having a dominant southerly component (Tyson and Preston-Whyte, 2000).

Easterly and westerly wave disturbances cause a southerly wind flow and tend to hinder the persistence of inversions by destroying them or increasing their altitude, thereby facilitating the dilution and dispersion of pollutants. Pre-frontal conditions tend to reduce the mixing depth. The potential for the accumulation of pollutants during pre-frontal conditions is therefore enhanced over the plateau (Tyson and Preston-Whyte, 2000).

2.2. Site-Specific Dispersion Potential

A period wind rose for the proposed combustion plant is presented in Figure 2.1. Wind roses comprise of 16 spokes which represent the directions from which winds blew during the period. The colours reflect the different categories of wind speeds. The dotted circles provide information regarding the frequency of occurrence of wind speed and direction categories.

Based on an evaluation of the site specific meteorological data obtained from the South African Weather Services in Ermelo, the following deductions regarding the prevailing wind direction and wind frequency can be assessed. Looking at Figure 2-1 below, the predominant wind direction within the area is mainly from the East and north Eastern region. Secondary winds are noted from the North and North western region. At the site, 19 % of the time, calm conditions existed over the area. The highest frequency of wind speeds lie between 3.6 - 5.7 m/s and 2.1 – 3.6 m/s which occurred for 32 % and 22% of the time respectively.

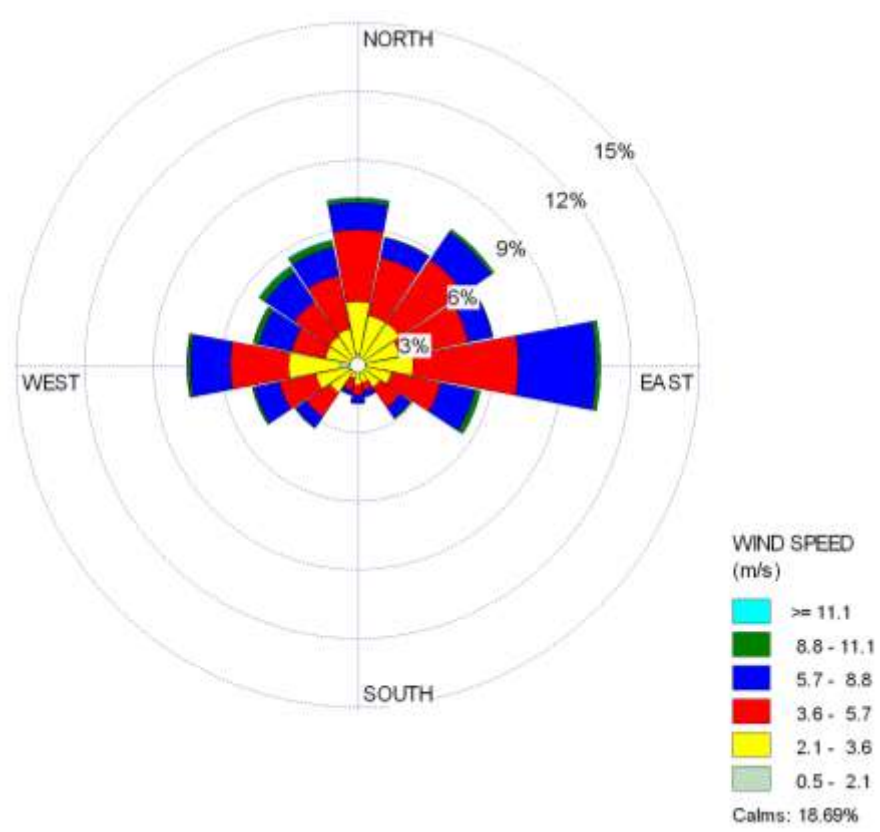


Figure 2-1: Period wind rose for Busby Renewable energy for the January 2009- December 2012 period.

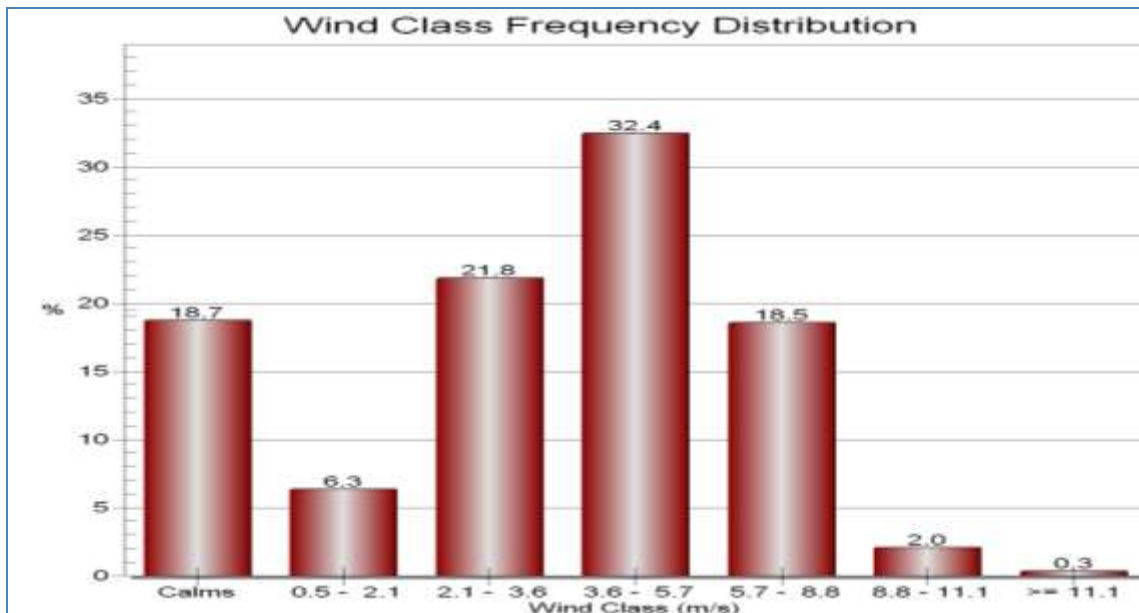


Figure 2-2: Wind class frequency distribution for the Ermelo area

2.3. Atmospheric Stability

The tendency of the atmosphere to resist or enhance vertical motion and thus turbulence is termed atmospheric stability. Stability is related to both the change of temperature with height and wind speed. A neutral atmosphere neither enhances nor inhibits mechanical turbulence. An unstable atmosphere enhances turbulence, whereas a stable atmosphere inhibits mechanical turbulence. The turbulence of the atmosphere is the most important parameter affecting dilution of air pollution as the more unstable the atmosphere, the greater the dilution of air pollution.

Atmospheric stability is commonly categorised into six stability classes (Table 2-1). The atmospheric boundary layer is usually unstable during the day due to turbulence caused by the sun's heating effect on the earth's surface. The depth of this mixing layer depends mainly on the amount of solar radiation, increasing in size gradually from sunrise to reach a maximum at about 5 - 6 hours after sunrise. The degree of thermal turbulence is increased on clear warm days with light winds. During the night-time a stable layer, with limited vertical mixing, exists. During windy and/or cloudy conditions, the atmosphere is normally neutral.

Table 2-1: Atmospheric Stability Classes

A	Very unstable	calm wind, clear skies, hot daytime conditions
B	Moderately unstable	clear skies, daytime conditions
C	Unstable	moderate wind, slightly overcast daytime conditions
D	Neutral	high winds or cloudy days and nights
E	Stable	moderate wind, slightly overcast night-time conditions
F	Very stable	low winds, clear skies, cold night-time conditions

The site experienced very stable conditions which is characteristic of low winds, clear skies and cold night-time conditions (Figure 2.3).

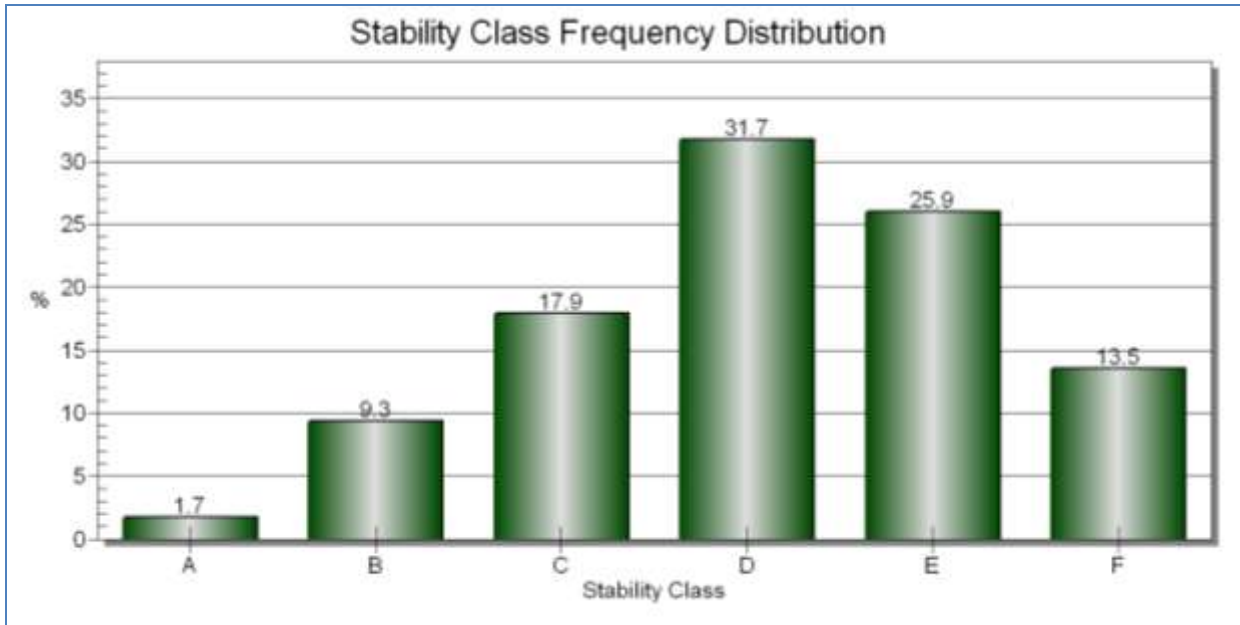


Figure 2-3: Stability class frequency distribution.

2.4. Temperature

Temperature affects the formation, action, and interactions of pollutants in various ways (Kupchella & Hyland, 1993). Chemical reaction rates tend to increase with temperature and the warmer the air, the more water it can hold and hence the higher the humidity. Temperature also provides an indication of the rate of development and dissipation of the mixing layer as well as determining the effect of plume buoyancy; the larger the temperature difference between the plume and ambient air, the higher the plume is able to rise. Higher plume buoyancy will result in an increased lag time between the pollutant leaving the source, and reaching the ground. This additional time will allow for greater dilution and ultimately a decrease in the pollutant concentrations when reaching ground level. The average monthly temperatures for the Busby area are depicted in Figure 2-4. Daily summer temperatures range between $\sim 17^{\circ}\text{C}$ and $\sim 18^{\circ}\text{C}$. Winter temperatures range between $\sim 7^{\circ}\text{C}$ and $\sim 12^{\circ}\text{C}$. Spring temperatures range between $\sim 8^{\circ}\text{C}$ and $\sim 16^{\circ}\text{C}$, while autumn temperatures range between $\sim 15^{\circ}\text{C}$ and $\sim 17^{\circ}\text{C}$.

Humidity is the mass of water vapour per unit volume of natural air. When temperatures are at their highest the humidity is also high, the moisture is trapped inside the droplets of the water vapour. This makes the moisture content of the air high. When relative humidity exceeds 70%, light scattering by suspended particles begins to increase, as a function of increased water uptake by the particles (CEPA/FPAC Working Group, 1999). This results in decreased visibility due to the resultant haze. Many pollutants may also dissolve in water to form acids, as well as secondary pollutants within the atmosphere. From Figure 2-4 it is evident that the humidity is highest during the summer and spring months and lowest in the winter months.

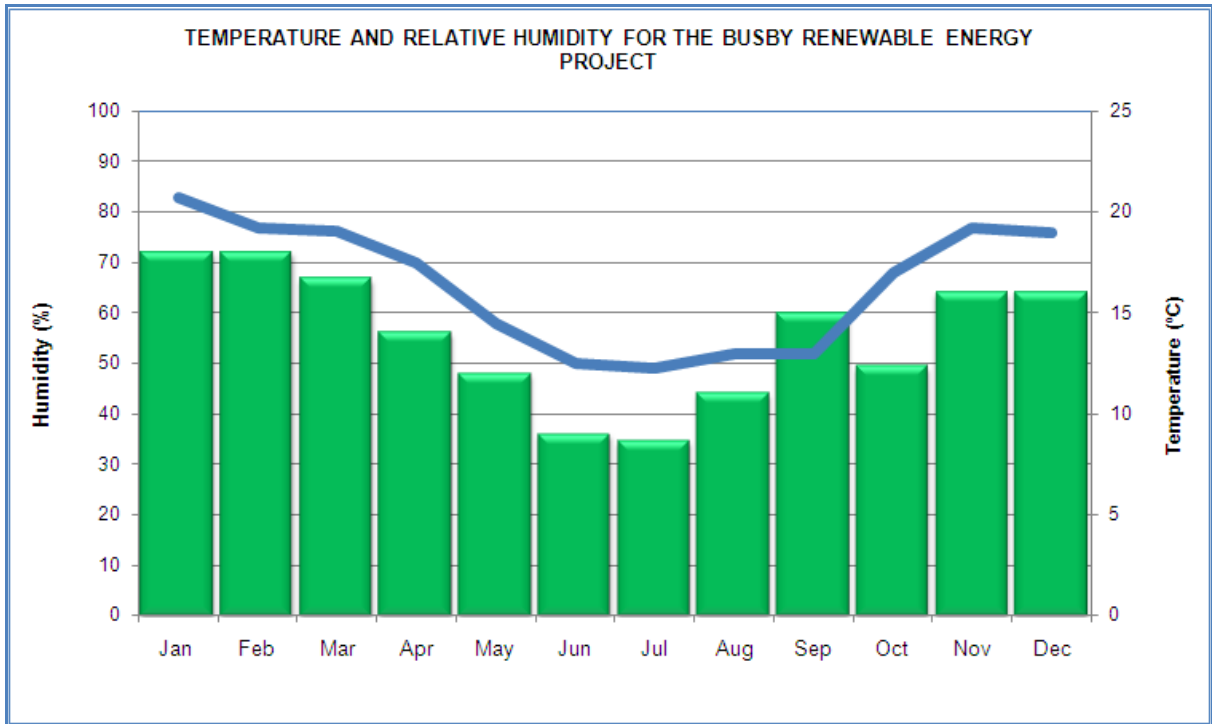


Figure 2-4: Monthly average temperature and humidity for the Busby renewable project for the Jan 2009 - Dec 2012 period.

2.5. Precipitation

Precipitation cleanses the air by washing out particles suspended in the atmosphere (Kupchella & Hyland, 1993). It is calculated that precipitation accounts for about 80-90% of the mass of particles removed from the atmosphere (CEPA/FPAC Working Group, 1999). Total monthly rainfall figures for the area are depicted in Figure 2-5. Total rainfall measured for the January 2009- December 2012 period is 1371 mm.

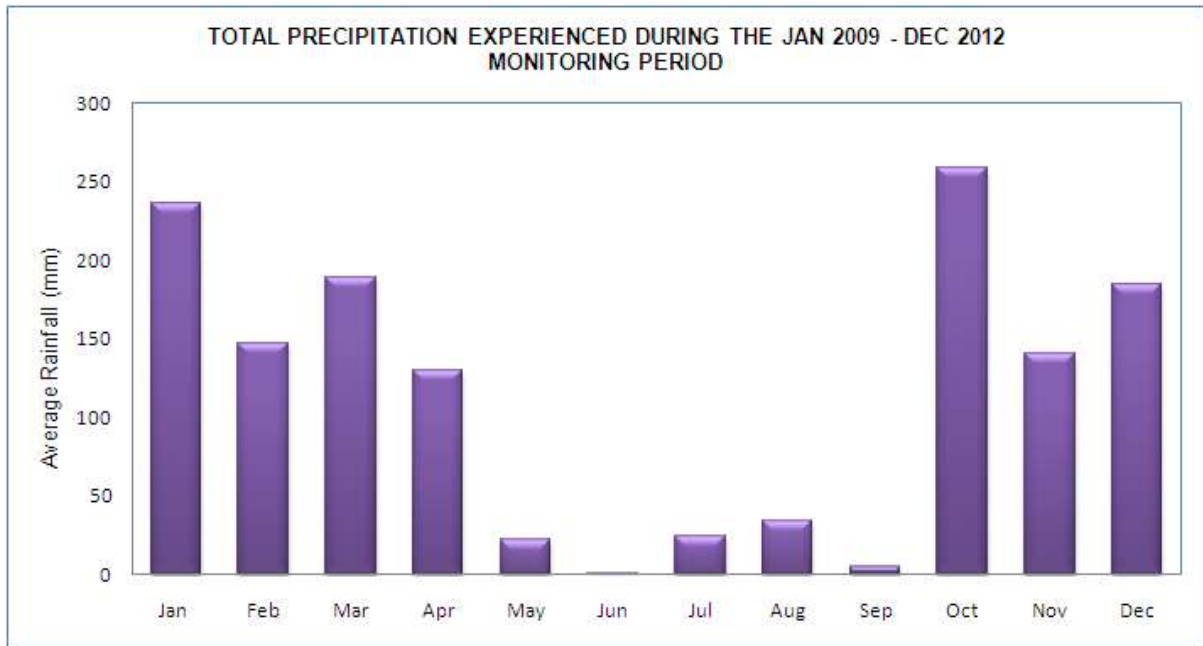


Figure 2-5: Total precipitation experienced at the Ermelo area during the January 2009 to December 2012 monitoring period.

3. Applicable Air Quality Legislation

3.1. South African legislative and standards frameworks

3.1.1. Ambient Guidelines

Air quality guidelines and standards are fundamental to effective air quality management, providing the link between the source of atmospheric emissions and the user of that air at the downstream receptor site. The ambient air quality guideline values indicate safe daily exposure levels for the majority of the population, including the very young and the elderly, throughout an individual's lifetime. Air quality guidelines and standards are normally given for specific averaging periods. These averaging periods refer to the time-span over which the air concentration of the pollutant was monitored at a location. Generally, five averaging periods are applicable, namely an instantaneous peak, 1-hour average, 24-hour average, 1-month average, and annual average.

The Department of Environmental Affairs and Tourism (DEAT) have issued ambient air quality guidelines to support receiving environment management practices. Ambient air quality guidelines are only available for such criteria pollutants which are commonly emitted, such as SO₂, Pb, NO_x, particulates and CO. These guidelines are discussed in the subsequent subsections, and comparisons made with the guidelines and standards promulgated by other countries and organisations. (No ambient air quality criteria standards exist for VOCs or HCs. Although various exposure guidelines are available for determining the significance of these pollutants, such guidelines will not be included in the current study.

2.6.2.2 Particulate Matter

Particulate matter is the collective name for fine solid or liquid particles added to the atmosphere by processes at the earth's surface. Particulate matter includes dust, smoke, soot, pollen and soil particles (Kemp, 1998). Particulate matter has been linked to a range of serious respiratory and cardiovascular health problems. The key effects associated with exposure to ambient particulate matter include: premature mortality, aggravation of respiratory and cardiovascular disease, aggravated asthma, acute respiratory symptoms, chronic bronchitis, decreased lung function, and an increased risk of myocardial infarction (USEPA, 1996).

Particulate matter represents a broad class of chemically and physically diverse substances. Particles can be described by size, formation mechanism, origin, chemical composition, atmospheric behaviour and method of measurement. The concentration of particles in the air varies across space and time, and is related to the source of the particles and the transformations that occur in the atmosphere (USEPA, 1996).

Particulate Matter can be principally characterised as discrete particles spanning several orders of magnitude in size, with inhalable particles falling into the following general size fractions (USEPA, 1996):

- PM10 (generally defined as all particles equal to and less than 10 microns in aerodynamic diameter; particles larger than this are not generally deposited in the lung);
- PM2.5, also known as fine fraction particles (generally defined as those particles with an aerodynamic diameter of 2.5 microns or less)
- PM10-2.5, also known as coarse fraction particles (generally defined as those particles with an aerodynamic diameter greater than 2.5 microns, but equal to or less than a nominal 10 microns); and
- Ultra fine particles generally defined as those less than 0.1 microns.

Fine and coarse particles are distinct in terms of the emission sources, formation processes, chemical composition, atmospheric residence times, transport distances and other parameters. Fine particles are directly emitted from combustion sources and are also formed secondarily from gaseous precursors such as sulphur dioxide, nitrogen oxides, or organic compounds. Fine particles are generally composed of sulphate, nitrate, chloride and ammonium compounds, organic and elemental carbon, and metals.

Table 3-1: Ambient Air Quality Guidelines for Particulate Matter

Pollutant	Averaging period ($\mu\text{g}/\text{m}^3$)	Guideline ($\mu\text{g}/\text{m}^3$)	Number of Exceedance Allowed Per Year
PM10	Daily average	120 ⁽¹⁾	4
		75 ⁽²⁾	4
	Annual average	50 ⁽¹⁾	0
		40 ⁽²⁾	0
PM2.5	Daily average	65 ⁽³⁾	4
		40 ⁽⁴⁾	4
		25 ⁽⁵⁾	4
	Annual average	25 ⁽³⁾	0
		20 ⁽⁴⁾	0
		15 ⁽⁵⁾	0

(1) Come into effect immediately until 31 December 2014

(2) Come into effect 1st January 2015

(3) Come into effect immediately until 31 December 2015

(4) Come into effect 1 January 2016 – 31 December 2029

(5) Come into effect 1 January 2030

2.6.2.3 Sulphur dioxide

SO₂ is an irritant that is absorbed in the nose and aqueous surfaces of the upper respiratory tract, and is associated with reduced lung function and increased risk of mortality and morbidity. Adverse health effects of SO₂ include coughing, phlegm, chest discomfort and bronchitis.

Short-period exposures (less than 24 hours)

Most information on the acute effects of SO₂ comes from controlled chamber experiments on volunteers exposed to SO₂ for periods ranging from a few minutes up to one hour (WHO 2000). Acute responses occur within the first few minutes after commencement of inhalation. Further exposure does not increase effects. Effects include reductions in the mean forced expiratory volume over one second (FEV₁), increases in specific airway resistance, and symptoms such as wheezing or shortness of breath. These effects are enhanced by exercise that increases the volume of air inspired, as it allows SO₂ to penetrate further into the respiratory tract. A wide range of sensitivity has been demonstrated, both among normal subjects and among those with asthma. People with asthma are the most sensitive group in the community. Continuous exposure-response relationships, without any clearly defined threshold, are evident.

Sub-chronic exposure over a 24-hour period

Information on the effects of exposure averaged over a 24-hour period is derived mainly from epidemiological studies in which the effects of SO₂, suspended particulate matter and other

associated pollutants are considered. Exacerbation of symptoms among panels of selected sensitive patients seems to arise in a consistent manner when the concentration of SO₂ exceeds 250 µg/m³ in the presence of suspended particulate matter. Several more recent studies in Europe have involved mixed industrial and vehicular emissions now common in ambient air. At low levels of exposure (mean annual levels below 50 µg/m³; daily levels usually not exceeding 125 µg/m³) effects on mortality (total, cardiovascular and respiratory) and on hospital emergency admissions for total respiratory causes and chronic obstructive pulmonary disease (COPD), have been consistently demonstrated. These results have been shown, in some instances, to persist when black smoke and suspended particulate matter levels were controlled for, while in others no attempts have been made to separate the pollutant effects. In these studies no obvious threshold levels for SO₂ has been identified.

Long-term exposure

Earlier assessments, using data from the coal-burning era in Europe judged the lowest-observed-adverse-effect level of SO₂ to be at an annual average of 100 µg/m³, when present with suspended particulate matter. More recent studies related to industrial sources of SO₂, or to the changed urban mixture of air pollutants, have shown adverse effects below this level. There is, however, some difficulty in finding this value.

Based upon controlled studies with asthmatics exposed to SO₂ for short periods, the WHO (WHO 2000) recommends that a value of 500 µg/m³ (0.175 ppm) should not be exceeded over averaging periods of 10 minutes. Because exposure to sharp peaks depends on the nature of local sources, no single factor can be applied to estimate corresponding guideline values over longer periods, such as an hour. Day-to-day changes in mortality, morbidity, or lung function related to 24-hour average concentrations of SO₂ are necessarily based on epidemiological studies, in which people are in general exposed to a mixture of pollutants; and guideline values for SO₂ have previously been linked with corresponding values for suspended particulate matter. This approach led to a previous guideline 24-hour average value of 125 µg/m³ (0.04 ppm) for SO₂, after applying an uncertainty factor of two to the lowest-observed-adverse-effect level. In more recent studies, adverse effects with significant public health importance have been observed at much lower levels of exposure. However, there is still a large uncertainty with this and hence no concrete basis for numerical changes of the 1987-guideline values for SO₂.

The EC's air quality criteria represent standards to be achieved by the year 2005, and would supersede the EU standards. The ambient air quality standards of the US-EPA are based on clinical and epidemiological evidence. These standards were established by determining concentrations with the lowest-observed-adverse effect, adjusted by an arbitrary margin of safety factor to allow for uncertainties in extrapolating from animals to humans and from small groups of humans to larger populations. The standards of the US-EPA also reflect the technological feasibility of attainment.

Table 3-2: Ambient Air Quality Guidelines and Standards for Sulphur Dioxide

Origin	Annual Average Maximum (µg/m ³)	24-Hour Maximum (µg/m ³)	1-Hour Maximum (µg/m ³)	<1-Hour Maximum (µg/m ³)
RSA	50	125	350	500 (10 min average)
WHO	50 ⁽¹⁾ 10-30 ⁽²⁾	125 ⁽¹⁾	-	500 ⁽¹⁾ (10 min average)
EC	20 ⁽³⁾	125 ⁽⁴⁾	350 ⁽⁵⁾	
UK	20 ⁽⁶⁾	125 ⁽⁷⁾	350 ⁽⁸⁾	266 ⁽⁹⁾ (15 min mean)
World Bank	50 ⁽¹⁰⁾	125 ⁽¹⁰⁾	-	-

US-EPA	80	365	-	-
Australia	53 ⁽¹¹⁾	209 ⁽¹²⁾	520 ⁽¹³⁾	-

Notes:

- (1) Air quality guidelines (issued by the WHO for Europe) for the protection of human health (WHO, 2000).
- (2) Represents the critical level for ecotoxic effects (issued by the WHO for Europe); a range is given to account for different sensitivities of vegetation types.
- (3) Limit value to protect ecosystems. Applicable two years from entry into force of the Air Quality Framework Directive 96/62/EC.
- (4) Limit to protect health, to be complied with by 1 January 2005. (Not to be exceeded more than 3 times per calendar year)
- (5) Limit to protect health, to be complied with by 1 January 2005. (Not to be exceeded more than 4 times per calendar year.)
- (6) Given as annual and winter (1 Oct to 31 March) mean, to be complied with by 31 December 2000.
- (7) 24-hour mean, not to be exceeded more than 24 times a year. Compliance required by 31 December 2004.
- (8) 1-hour mean, not to be exceeded more than 24 times a year. Compliance required by 31 December 2004
- (9) 15-minute mean, not to be exceeded more than 35 times a year. Compliance required by 31 December 2005.
- (10) Ambient air concentration permissible at property boundary.
- (11) Standard set in June 1998 as 0.02 ppm. Goal within 10 years is to have no exceedances.
- (12) Standard set in June 1998 as 0.08 ppm. Goal within 10 years is to have maximum allowable exceedances of 1 day per year.
- (13) Standard set in June 1998 as 0.20 ppm. Goal within 10 years is to have maximum allowable exceedances of 1 day per year.

2.6.2.4. Oxides of Nitrogen

Air quality guidelines and standards issued by most other countries and organisations tend to be given exclusively for NO₂ concentrations as NO₂ is the most important species from a human health point of view. International and South African standards for NO₂ are presented in Table 2-4.

Table 3-3: Ambient Air Quality Guidelines and Standards for Nitrogen Dioxide

Averaging Period	South Africa		WHO		EC		Australia	
	µg/m ³	ppm	µg/m ³	ppm	µg/m ³	ppm	µg/m ³	ppm
Annual Ave	40	0.021	40	0.021	40	0.021	57	0.03
Max. 1-hr	200	0.10	200	0.10	200	0.10	240	0.12

NO is one of the primary pollutants emitted by aircraft and motor vehicle exhausts. As discussed previously, NO₂ is formed through oxidation of these oxides once released in the air. NO₂ is an irritating gas that is absorbed into the mucous membrane of the respiratory tract. The most adverse health effect occurs at the junction of the conducting airway and the gas exchange region of the lungs. The upper airways are less affected because NO₂ is not very soluble in aqueous surfaces. Exposure to NO₂ is linked with increased susceptibility to respiratory infection, increased airway resistance in asthmatics and decreased pulmonary function.

Available data from animal toxicology experiments indicate that acute exposure to NO₂ concentrations of less than 1 880 µg/m³ (1 ppm) rarely produces observable effects (WHO 2000). Normal healthy humans, exposed at rest or with light exercise for less than two hours to concentrations above 4 700 µg/m³ (2.5 ppm), experience pronounced decreases in pulmonary function; generally, normal subjects are not affected by concentrations less than 1 880 µg/m³ (1.0 ppm). One study showed that the lung function of subjects with chronic obstructive pulmonary disease is slightly affected by a 3.75-hour exposure to 560 µg/m³ (0.3 ppm) (WHO 2000).

Asthmatics are likely to be the most sensitive subjects, although uncertainties exist in the health database. The lowest concentration causing effects on pulmonary function was reported from two laboratories that exposed mild asthmatics for 30 to 110 minutes to 565 $\mu\text{g}/\text{m}^3$ (0.3 ppm) NO_2 during intermittent exercise. However, neither of these laboratories was able to replicate these responses with a larger group of asthmatic subjects. NO_2 increases bronchial reactivity, as measured by the response of normal and asthmatic subjects following exposure to pharmacological bronchoconstrictor agents, even at levels that do not affect pulmonary function directly in the absence of a bronchoconstrictor. Some, but not all, studies show increased responsiveness to bronchoconstrictors at NO_2 levels as low as 376-565 $\mu\text{g}/\text{m}^3$ (0.2 to 0.3 ppm); in other studies, higher levels had no such effect. Because the actual mechanisms of effect are not fully defined and NO_2 studies with allergen challenges showed no effects at the lowest concentration tested (188 $\mu\text{g}/\text{m}^3$; 0.1 ppm), full evaluation of the health consequences of the increased responsiveness to bronchoconstrictors is not yet possible.

3.2. Licensing Requirements

The National Environmental Management: Air Quality Act (39 of 2004) includes the following regarding Atmospheric Emission Licenses.

22. No person may without a provisional atmospheric emission license or an atmospheric license conduct an activity:

- (a) Listed in the National List anywhere in the Republic; or
- (b) Listed on the list applicable in a province anywhere in that province;

AQA Implementation

Listed Activities and Minimum Emission Standards

Listed Activities and associated minimum emission standards identified in terms of section 21 of the National Environmental Management: Air Quality Act, 39 of 2004 (31 March 2010 GG Vol. 537 No. 33064)

Category 1. Combustion installations

Number 1.3: Solid Biomass fuel combustion installations used primarily for steam raising or electricity generation.

All installations with a design capacity equal to or greater than 50MW heat input per unit, based on the lower calorific value of the fuel used.

Notes:

Should this be triggered an Atmospheric Emission License is required

3.3. Highveld Priority Area

The Busby renewable energy project is located in the Highveld Priority Area and is the area illustrated on the map below (Figure 3-1). The Highveld Priority Area of South Africa is associated with poor air quality and has elevated concentrations of criteria pollutants which are attributed to both industrial and non industrial sources. The Highveld Priority Area covers approximately 31 106 km^2 which includes parts of Gauteng and the Mpumalanga province. The area encompasses of 1 metropolitan

municipality, 3 district municipalities and 9 local municipalities. Most of the Highveld Priority area experiences relatively good air quality but ambient air quality standards for pollutants such as SO₂, PM₁₀ and ozone (O₃) are extensively exceeded in 9 “Hot spot” areas (Witbank, Middelburg, Secunda, Ermelo, Standerton, Balfour and Komati).

All industrial activities with listed activities operating within the Highveld Priority area are required to implement the Air Quality Management plan within their business plans. Busby Renewable Energy does not fall within industries operating under listed activities.



Figure 3-1: Map illustrating the Highveld Priority area.

3.4. Other Polluting Sources in the area

A detailed emissions inventory for the Ermelo area is not available. Based on a 1:50 000 topographical map; the following sources of air pollution have however been identified. These are important to consider in terms of assessing the cumulative impact potential on air quality in the region:

- Agricultural activities;
- Veld Fires;
- Domestic Fuel Burning
- Power stations

3.4.1. Agricultural activities

Agricultural activity can be considered a significant contributor to particulate emissions, although tilling, harvesting and other activities associated with field preparation are seasonally based. The Ermelo area has a mixed variety of farming such as maize, cattle, potatoes, beans, wool, pigs, sunflower seeds, Lucerne and sorghum. Particulate emissions can arise due to the mechanical actions of equipment during tilling and harvesting seasons. Gaseous and particulate emissions can arise from fertiliser treatment and application of herbicides and pesticides on crops. Anthracite, coal and torbanite mining also take place in this area.

The main focus internationally with respect to emissions generated due to agricultural activity is related to animal husbandry, with special reference to malodours generated as a result of the feeding and cleaning of animal. The types of livestock assessed included pigs, sheep, goats and chickens. Emissions assessed include ammonia and hydrogen sulphide (USEPA, 1996).

3.4.2. Veld Fires

A veld fire is a large-scale natural combustion process that consumes various ages, sizes, and types of flora growing outdoors in a geographical area. The size, intensity and occurrence, of veld fires depend directly on the meteorological condition, the species of vegetation involved, moisture content, and the weight of consumable fuel per hectare (available fuel loading).

Once a fire begins, the dry combustible material is consumed first. If the energy released is large and of sufficient duration, the drying of green, live material occurs, with subsequent burning of this material as well. Under suitable environmental and fuel conditions, this process may initiate a chain reaction that results in a widespread conflagration. It has been hypothesized, but not proven, that the nature and amounts of air pollutant emissions are directly related to the intensity and direction (relative to the wind) of the veld fire, and are indirectly related to the rate at which the fire spreads. The factors that affect the rate of spread are (1) weather (wind velocity, ambient temperature, relative humidity); (2) fuels (fuel type, fuel bed array, moisture content, fuel size); and (3) topography (slope and profile). However, logistical problems (such as size of the burning area) and difficulties in safely situating personnel and equipment close to the fire have prevented the collection of any reliable emissions data on actual veld fires, so that it is not possible to verify or disprove the hypothesis.

The major pollutants from veld burning are particulate matter, carbon monoxide, and volatile organics. Nitrogen oxides are emitted at rates of from 1 to 4 g/kg burned, depending on combustion temperatures. Emissions of sulphur oxides are negligible (USEPA, 1996). A study of biomass burning in the African savannah estimated that the annual flux of particulate carbon into the atmosphere is estimated to be of the order of 8 Tg C, which rivals particulate carbon emissions from anthropogenic activities in temperate regions (Cachier *et al*, 1995).

3.4.3. Domestic Fuel Burning

Due to the close proximity to informal settlements, it is anticipated that low income households in the area are likely to combust domestic fuels for space heating and/ or cooking purposes. Exposure to indoor air pollution (IAP) from the combustion of solid fuels is an important cause of morbidity and mortality in developing communities. Biomass and coal smoke contain a large number of pollutants and known health hazards, including PM, CO, NO₂, SO₂ (mainly from coal), formaldehyde, and polycyclic organic matter, including carcinogens such as benzo[a]pyrene (Ezzati and Kammen, 2002).

Exposure to indoor air pollution (IAP) from the combustion of solid fuels has been implicated, with varying degrees of evidence, as a causal agent of several diseases in developing countries, including acute respiratory infections (ARI) and otitis media (middle ear infection), chronic obstructive

pulmonary disease (COPD), lung cancer (from coal smoke), asthma, cancer of the nasopharynx and larynx, tuberculosis, perinatal conditions and low birth weight, and diseases of the eye such as cataract and blindness (Ezzati and Kammen, 2002).

Monitoring of pollution and personal exposures in biomass-burning households has shown concentrations are many times higher than those in industrialized countries. The latest International Ambient Air Quality Standards, for instance, required the daily average concentration of PM10 to be < 180 $\mu\text{g}/\text{m}^3$ (annual average < 60 $\mu\text{g}/\text{m}^3$). In contrast, a typical 24-hr average concentration of PM10 in homes using bio fuels may range from 200 to 5 000 $\mu\text{g}/\text{m}^3$ or more throughout the year, depending on the type of fuel, stove, and housing. Concentration levels, of course, depend on where and when monitoring takes place, because significant temporal and spatial variations may occur within a house. Field measurements, for example, recorded peak concentrations of > 50 000 $\mu\text{g}/\text{m}^3$ in the immediate vicinity of the fire, with concentrations falling significantly with increasing distance from the fire. Overall, it has been estimated that approximately 80% of total global exposure to airborne particulate matter occurs indoors in developing nations. Levels of CO and other pollutants also often exceed international guidelines (Ezzati and Kammen, 2002).

3.4.4. Power stations

Majuba Power station is a syngas fired power station which is produced by underground coal gasification (UCG). The power station is located approximately 70 km west of the Busby Renewable Energy project. UCG is a process which converts coal into product gas. This is accomplished through the *in situ* gasification process which converts coal to gas while still within the coal seam. The gas is produced and extracted through borehole/wells which are drilled into the unmined coal seam. Injection wells are used to supply the oxidants (air, oxygen or steam) to ignite and fuel the underground combustion process and a separate production well is used to bring the product gas to the surface. The high pressure combustion can reach temperatures of up to 700 – 900 °C.

Underground combustions produce NO_x , SO_x , Ammonia and hydrogen sulphide. Aquifer contamination can be a potential environmental concern. Organic and toxic material such as phenols remains in the underground chamber after gasification and has the potential to leach into ground water.

3.5. Sensitive Receptors

Residential, educational and recreational land uses are considered to be sensitive receptors. Informal settlements were identified south west of the Biomass combustion plant. (Figure 3-2). However the area surrounding the combustion plant is predominantly agricultural.



Figure 3-2: Map indicating the location of sensitive receptors,

4. Fatal Flaw Assessment

During the Fatal flaw assessment, the information provided by the client was used to establish the possible air quality impacts which may arise as from the expansion of the biomass combustion plant.

Table 4-1: Stack Specifications

Input parameters	Value
Stack height	40.2 m
Exit velocity	18.28 m/s
Inside stack diameter	1.28 m
Gas exit temperature	448 K

The Major emissions of concern when using plantation residue for combustion is Particulate matter. Emissions are dependant on the composition of the residue that is combusted and the particle control device. Oxides of Nitrogen may also be emitted in significant quantities when specific type of plantations residues is combusted or when operating conditions are poor. In comparison, NO_x emissions from wet barks and wood boilers are typically lower (approximately one-half) in comparison to NO_x emissions from dry wood fired boilers. If proper drying conditions are impaired or when secondary combustion is incomplete as a result, the combustion temperature is lowered which increases the emissions of PM, CO and organic compound emissions which can result regardless of the boiler type. (AP 42, Section 1.6)

Greenhouse gases such as Carbon monoxide (CO), methane (CH₄) and nitrous oxide (N₂O) are also produced during wood residue combustion (AP 42, Section 1.6). CO₂ is produced during the fuel combustion of carbon. The concentration of Carbon monoxide as a result of CO₂ formation is insignificant. The formation of N₂O is dependent on many factors and its emission can be minimised when combustion temperatures are high (801 °C) and excess air is kept at a minimum. Methane emissions are normally highest during periods of low temperature combustion, incomplete combustion and start up and shut down conditions (AP 42, Section 1.6).

Taking into consideration the design capacity, plantation residue and information provided by the client, it is anticipated that the emissions from pollutants such as PM, NO_x and SO₂ are anticipated to be released from the biomass combustion operations.

No dust fallout concentrations were included in this Fatal Flaw assessment as the Screen3 model outputs maximum 1 hour ground level concentrations (µg/m³). The emission rate used in Screen3 model is shown in table 4-2 below.

Table 4-2: Emission rate of each pollutant anticipated to be released.

Pollutant	Value	Mitigation
Particulate Matter	78.87 g/s	90% ⁽¹⁾
Sulphur Dioxide	10.52 g/s	50% ⁽¹⁾
Oxides of Nitrogen	10.52 g/s	85% ⁽¹⁾

(1) Mitigation factors were taken from the US-EPA (AP 42, Section 1.6)

4.1.1. Particulate Matter

The maximum predicted PM concentration recorded at the site was 477.7 $\mu\text{g}/\text{m}^3$ at a distance of 768 m from the source (Figure 4-1). When considering a concentration control efficiency of 90% for particulate matter, the maximum hourly concentration recorded was 47.2 $\mu\text{g}/\text{m}^3$ (Figure 4-2).

The South African ambient air quality standards don't take into account hourly concentrations of particulate matter, therefore use was made of the EPA multiplying factor for point source emissions (Table 4-3 below). The unmitigated daily concentration of PM exceeded the South African standard of 120 $\mu\text{g}/\text{m}^3$. When considering a mitigation efficiency of 90 %, both annual and daily concentrations complied with the South African standard of 50 $\mu\text{g}/\text{m}^3$ and 120 $\mu\text{g}/\text{m}^3$ respectively.

Table 4-3: Point source multiplying factors of converting 1-hour average concentration estimates to longer averaging concentrations.

Averaging period	EPA Multiplying factor ⁽¹⁾	PM Concentration ($\mu\text{g}/\text{m}^3$) unmitigated	PM Concentration ($\mu\text{g}/\text{m}^3$) mitigated
24 hours	0.4	191.08	18.88
Annual	0.08	38.22	3.78

Note: ⁽¹⁾ – Source: screening procedure for estimating the Air Quality Impacts of stationary sources: Revised “EPA-454/R-92-019”

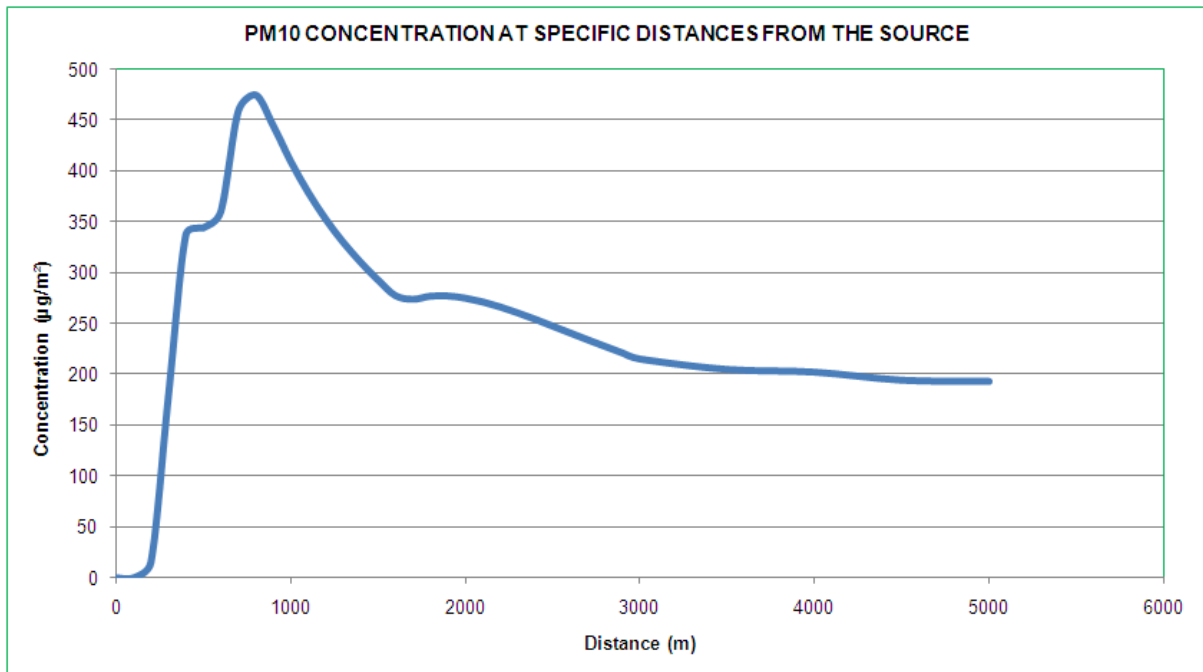


Figure 4-1: PM concentration ($\mu\text{g}/\text{m}^3$) at specific distances from the site.

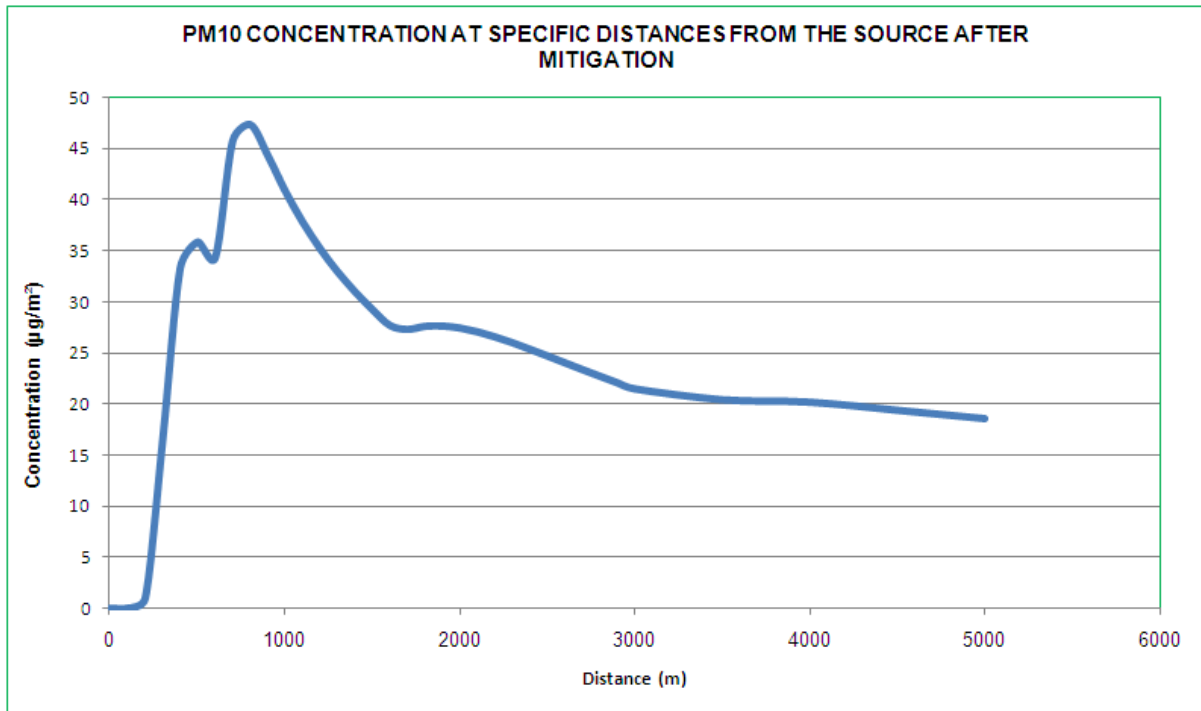


Figure 4-2: PM concentration ($\mu\text{g}/\text{m}^3$) at specific distances from the site after mitigation.

The HPHT vibrating grate boiler is equipped with an electrostatic precipitator (ESP) for flue gas cleaning. ESPs provide a control efficiency of 90% for particulate matter emissions within flue gas. ESP casing is equipped with discharge electrodes (DE) and collecting electrodes (CE) which are arranged in parallel, thus forming a gas passage. The collecting electrodes are positively poled and earthed. Gas ions adhere to dust particles and are charged. Due to the influence of the electric field, the charged particles migrate to the collecting electrodes forming a dust layer. Accumulated particulate matter is removed from the collection plates at periodic intervals. ESP ensures a high collection efficiency of 99% ash. It is resistant to high temperatures and has a low cost of maintenance.

4.1.2. Sulphur dioxide

Figure 4-3 below indicates the maximum hourly concentration of $63.65 \mu\text{g}/\text{m}^3$ of SO_2 for the proposed site. A Control efficiency of 50% was assumed as a mitigation measure. The maximum concentration after mitigation was predicted at $31.82 \mu\text{g}/\text{m}^3$. Both concentrations (mitigated and unmitigated) are below the South African Hourly Standard of $350 \mu\text{g}/\text{m}^3$.

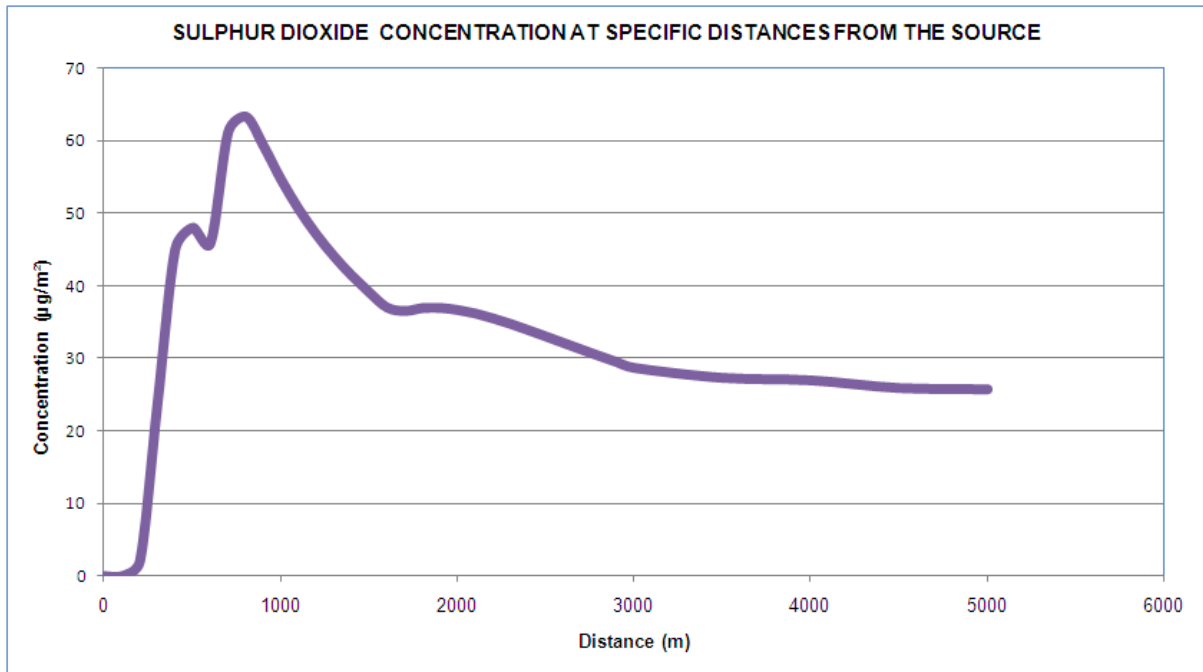


Figure 4-3: Sulphur dioxide concentration ($\mu\text{g}/\text{m}^3$) at specific distances from the source

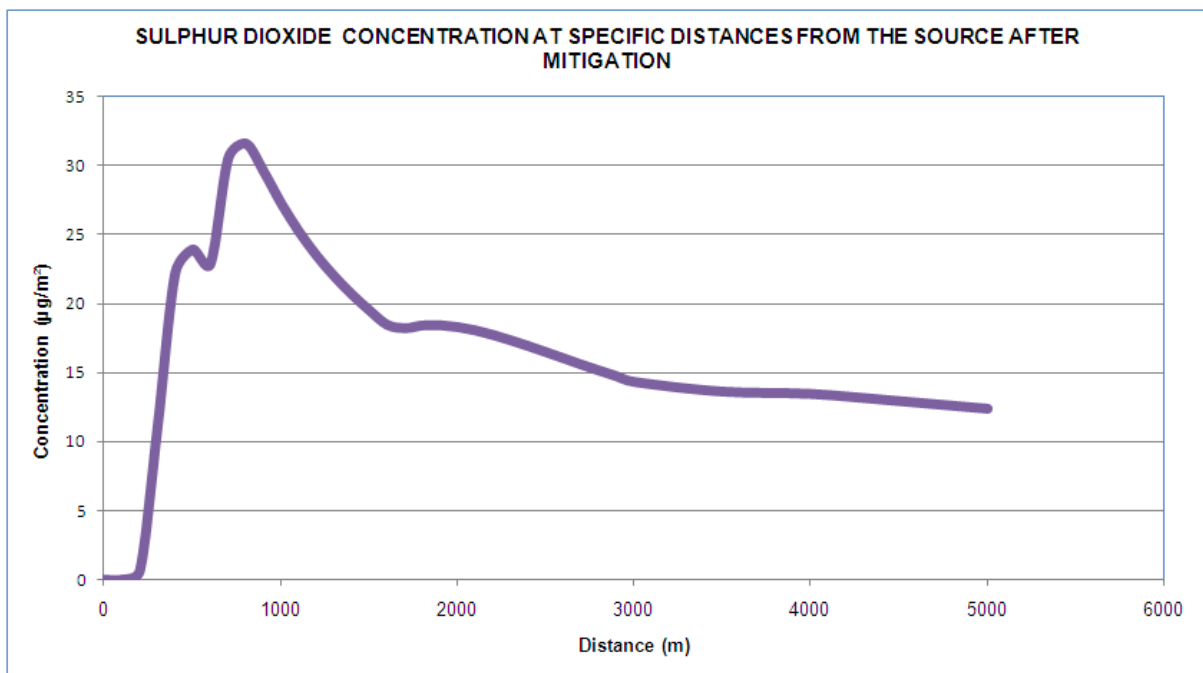


Figure 4-4: Sulphur dioxide concentration ($\mu\text{g}/\text{m}^3$) at specific distances from the source after mitigation.

4.1.3. Nitrous oxides

Figure 4-5 below illustrates the maximum predicted hourly concentration of $63.65 \mu\text{g}/\text{m}^3$ for the site. A control efficiency of 85 % was assumed as a mitigation measure for nitrous oxide emission from small boilers. The maximum predicted concentration after mitigation was predicted at $9.54 \mu\text{g}/\text{m}^3$ (Figure 4-

6). When compared to the hourly South African Ambient Air Quality standard of $200 \mu\text{g}/\text{m}^3$, both mitigated and unmitigated concentrations falls below the standard.

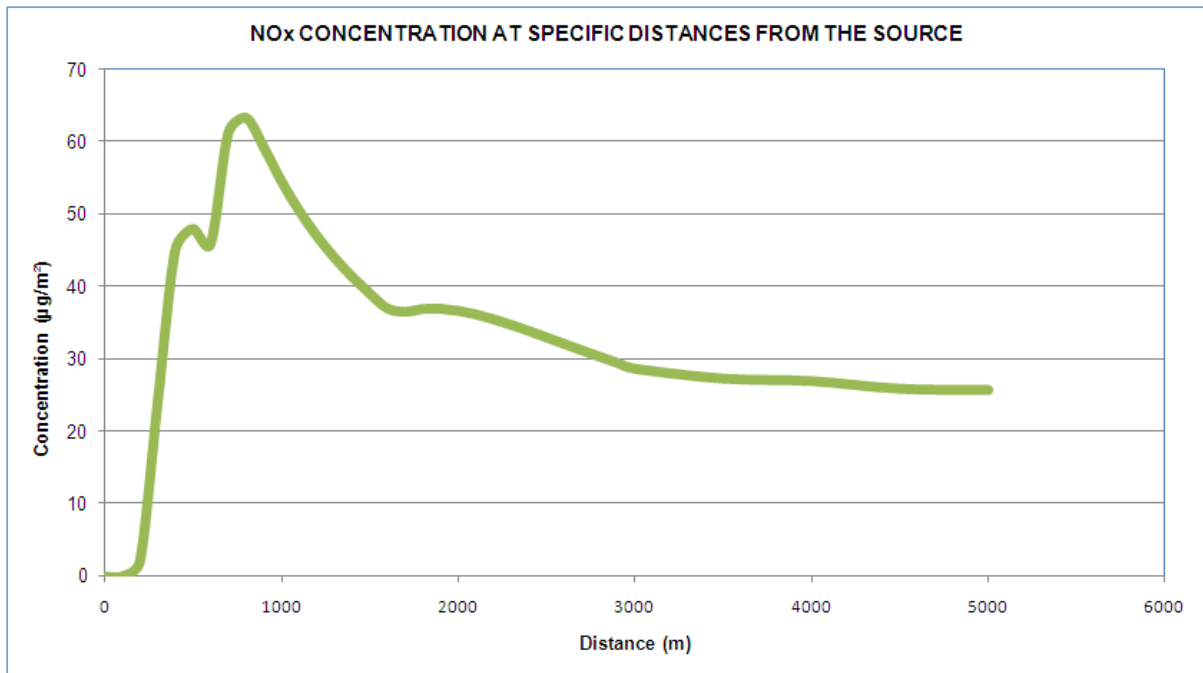


Figure 4-5: NO_x concentration ($\mu\text{g}/\text{m}^3$) at specific distances from the source.

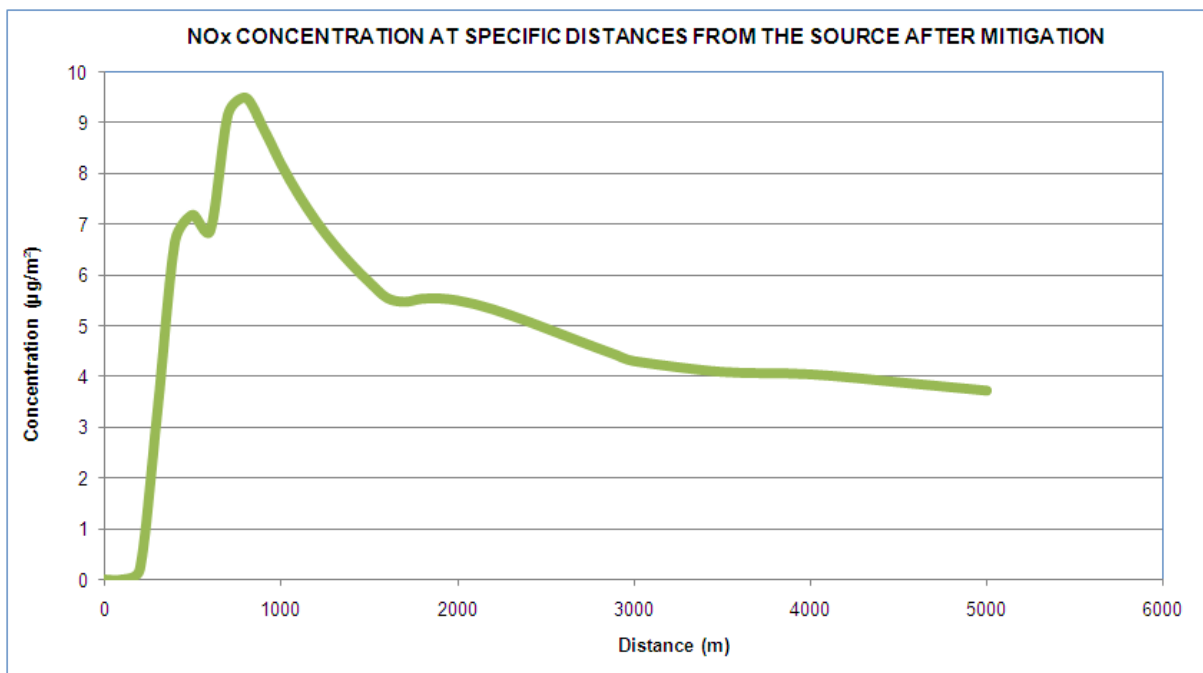


Figure 4-6: NO_x concentration ($\mu\text{g}/\text{m}^3$) at specific distances from the source.

4.2. Mitigation Measures

4.2.1. Construction Phase

Due to the lack of quantitative dust emission data for the site, it is recommended that precautionary principles be followed and dust control measures be implemented. Recommendations for the control of emissions resulting from the construction phase are shown in Table 4-4 below.

Table 4-4: Recommendations for the control of Fugitive dust emissions from the construction phase (USEPA, 1996).

Emission Source	Recommended Control Methods
Materials Handling (Debris)	Wind speed reduction
	Wet suppression ⁽¹⁾
Vehicle movements on unpaved roads ⁽²⁾	Wet suppression
	Paving
	Chemical stabilisation ⁽³⁾
General construction	Wind speed reduction
	Wet suppression
	Early paving of permanent roads

Note:

⁽¹⁾ Dust control plans should contain precautions against watering programs that confound trackout problems.

⁽²⁾ Loads could be covered to avoid loss of material in transport, especially if material is transported offsite.

⁽³⁾ Chemical stabilisation is usually cost-effective for relatively long-term or semi-permanent unpaved roads.

Water may be combined with a surfactant as wetting agent. Surfactants increase the surface tension of water, reducing the quantity of water required. Chemical stabilisation is of longer duration but is not cost effective for small-scale operations. Dust-A-Side (DAS) represents an example of a chemical product, which is commercially available and widely used by mines and quarries. The DAS product binds with the aggregate used to build on-site roads. It should be noted however, that the treatment with chemical stabilisers can have adverse effects on plant and animal life and can contaminate the treated material (USEPA, 1996).

Dust and mud should be controlled at vehicle exit and entry points to prevent the dispersion of dust and mud beyond the site boundary. Facilities for the washing of vehicles could be provided at the entry and exit points. A speed limit of 40 km/hr should be set for all vehicles travelling over exposed areas or near stockpiles. Traffic over exposed areas should be kept to a minimum (USEPA, 1996).

All forestry residue stockpiles should be maintained for as short a time as possible and should be enclosed by wind breaking enclosures of similar height to the stockpile. Location of material storage should take into account the predominant wind direction. During the transfer of material to piles, drop heights should be minimised to control the dispersion of materials being transferred (USEPA, 1996).

Additional preventative techniques include the reduction of the dust source extent and adjusting work processes to reduce the amount of dust generation (USEPA, 1996).

4.2.2. Operational Phase

In order to ensure satisfactory combustion and to minimize the amount of fly ash and coke flakes, the furnace is required to ensure that maximum velocity is maintained. Electrostatic precipitators are installed as a control mechanism which provides a control efficiency of 90% and reduces the amount of pollutants emitted. It is essential that regular maintenance is carried out and that equipments are operating at an achievable maximum efficiency. In order to provide a better indication of the extent of the impacts expected from the proposed operation of this development, dispersion simulations will need to be undertaken.

4.2.3. Decommissioning Phase

Revegetation of exposed areas for long-term dust and water erosion control is commonly used and is the most cost-effective option. Plant roots bind the soil, and vegetation cover breaks the impact of falling raindrops, thus preventing wind and water erosion. Plants used for revegetation should be indigenous to the area, hardy, fast-growing, nitrogen-fixing, provide high plant cover, be adapted to growing on exposed and disturbed soil (pioneer plants) and should easily be propagated by seed or cuttings.

4.3. Conclusion

All maximum predicted concentrations occurred at a distance of 800 m from the point source (stack). Mitigated and unmitigated concentrations were evaluated to determine the maximum impact resulting from the biomass combustion plant. In comparison to the hourly standards set for Nitrous oxide and Sulphur dioxide, both mitigated and unmitigated concentrations complied. Considering the remote location of the proposed plant, captive power of the boiler and the fact that controlled combustion of residue takes place; it can be assumed that the air quality impacts on the surrounding environment would be minimum. It must be noted that this assessment does not take into account cumulative impacts nor upset conditions. A summary table on the maximum predicted concentrations is shown in table 4-5 below.

Table 4-5: Summary table

Pollutant	Concentration ($\mu\text{g}/\text{m}^3$)		
	SANS Limits	Maximum concentration ($\mu\text{g}/\text{m}^3$) - unmitigated	Maximum concentration ($\mu\text{g}/\text{m}^3$) - mitigated
PM10	⁽¹⁾	477.7	47.2
SO ₂	350	63.65	31.82
NO _x	200	63.65	9.54

Note: ⁽¹⁾ – see table 4-3 for EPA multiplying factors

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Department:
Economic Development, Environment and Tourism
MPUMALANGA PROVINCIAL GOVERNMENT

Details of specialist and declaration of interest in respect of an application for authorisation in terms of the National Environmental Management Act, 1998 (Act No. 107 of 1998), as amended and the Environmental Impact Assessment Regulations, 2010

PROJECT TITLE

Tier 1 Assessment: Busby Renewable energy

Specialist:
Nature of specialist study compiled:
Contact person:
Postal address:
Postal code:
Telephone:
E-mail:
Qualifications & relevant experience:
Professional affiliation(s) (if any)

Air Quality		
Tier 1 assessment for the Busby renewable energy project		
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BSc Biological Sciences		

The specialist appointed in terms of the Regulations

I, Nicole Singh declare that -

General declaration:

- I act as the independent specialist in this application;
- I will perform the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the applicant;
- I declare that there are no circumstances that may compromise my objectivity in performing such work;
- I have expertise in conducting the specialist report relevant to this application, including knowledge of the Act, regulations and any guidelines that have relevance to the proposed activity;
- I will comply with the Act, regulations and all other applicable legislation;
- I will take into account, to the extent possible, the matters listed in Regulation 8;
- I have no, and will not engage in, conflicting interests in the undertaking of the activity;
- I undertake to disclose to the applicant and the competent authority all material information in my possession that reasonably has or may have the potential of influencing - any decision to be taken with respect to the application by the competent authority; and - the objectivity of any report, plan or document to be prepared by myself for submission to the competent authority;
- All the particulars furnished by me in this form are true and correct; and
- I realise that a false declaration is an offence in terms of Regulation 71 and is punishable in terms of section 24F of the Act.

Signature of specialist: 

Royal HaskoningDHV

Name of company:

25 July 2013

Date:

I certify that the DEPENDENT has acknowledged that he/she knows and understands the contents of this affidavit, that he/she does not have any objection to taking the oath, and that he/she considers it to be binding on his/her conscience, and which was sworn to and signed before me at WOODMEAD on this the 25th day of July 2013 and that the administering oath complied with the regulations contained in Government Gazette No R1256 of 21 July 1972, as amended".

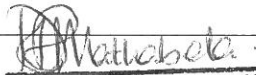
Signature of Commissioner of Oaths

25/07/2013

Date:

Designation: LEGAL COUNSEL

Official stamp (below)



COMMISSIONER OF OATHS

Dinky Mathabala
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APPENDIX 3:

Groundwater Impact study and Specialist Declaration Form

**CUMULATIVE IMPACTS FROM PROPOSED GROUNDWATER
ABSTRACTION AT BUSBY SAWMILLS AND SONAE
INDUSTRIES**



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**POTENTIAL IMPACT FROM PROPOSED GROUNDWATER
ABSTRACTION AT BUSBY AND SONAE**

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1 INTRODUCTION

1.1 TERMS OF REFERENCE

WSM Leshika was appointed by Eon consulting regarding an assessment of the impact of planned groundwater abstraction at Busby and Sonae.

1.2 BACKGROUND

WSM Leshika was initially appointed by Jannie Van der Mescht of Worley Parsons RSA regarding an assessment of the groundwater potential of the boreholes and of the property. Test pumping of the boreholes was undertaken between 21-25 April 2012. The originally proposed abstraction would have had significant impacts.

Subsequently, the project was taken over by Eon Consulting, and Eon Consulting appointed WSM Leshika to investigate the impact of proposed Busby abstraction on the neighbouring property of Sonae, and to determine the impacts on Sonae, since Sonae was also planning to expand their processes and their groundwater abstraction. The demands from both properties exceeded the local resources.

The two properties agreed to curtail their original water requirements and share the available groundwater, and they requested the investigation describe the cumulative impacts of both planned abstractions.

Busby Sawmills is located on the farm Valschvlei 352-IT and the property is 24.2 ha in size. Busby is located on the western border of Sonae. Busby Sawmills is investigating the upgrading of the existing sawmill facilities to implement renewable energy technology in the form of biomass combustion to generate steam and electricity. Two technologies were being considered for this renewable energy project – dry cooling and wet cooling. The dry cooling technology will require 147 m³ of water per day, while the wet cooling will requires 1200 - 1500 m³ water per day. The wet cooling option has since been dropped due to insufficient water resources.

WSM Leshika (Pty) Ltd conducted a geohydrological investigation at Busby, including test pumping of the existing boreholes, to evaluate the groundwater resources of the property. The investigation was to determine whether the existing boreholes, and the groundwater resources available on the property, would be able to sustain the water use requirements. The combined sustainable yield of the existing boreholes is 330 m³/d, however, since they are in close proximity, the sustainable yield is more likely to be 270 m³/d.

After discussions with Sonae, the estimated water requirement at Busby has been re-evaluated and is expected to rise from a current use of 52 m³/d, to 199 m³/d. Busby obtains groundwater from 3 existing boreholes, 2 of which are on Busby, and one on Sonae, through which water is accessed by a registered servitude (5663/71).

Sonae Novobord is 45.9 ha in size. The water use at Sonae is currently 65 m³/d, and is expected to rise by 123 m³/d with the addition of a resin plant, for a total demand of 188 m³/d.

1.3 SCOPE OF WORK

The geohydrological investigation at Busby was initiated to determine whether the existing boreholes can meet demands, and to quantify the groundwater resources available on the property. The scope of work was to:

- Assess the exploitation potential of the property to verify whether sufficient groundwater resources can be developed based on the size of the property.
- Test pump the existing 3 boreholes at Busby to calculate their sustainable yields.

Yield testing of the boreholes consisted of stepped discharge tests of 4 (four)-hour steps and a 24 hour constant discharge test to assess the productivity of the aquifer and borehole. The test results were analysed to provide information in regard to the hydraulic properties of the groundwater system and to provide an optimum yield for the medium to long-term utilisation of the borehole. A recovery test directly after the constant discharge test was performed to provide an indication of the ability of the borehole and groundwater system to recover from the stress of abstraction. Groundwater samples were collected for analysis.

Subsequently, the additional work undertaken was to:

- Assess the impact of the proposed abstraction at Busby on Sonae
- Assess the combined impact of abstractions at Sonae and Busby.

2 SITE DESCRIPTION

2.1 LOCATION

Busby sawmills is located on Portion 3 of the Farm Valschvlei 352-IT (figure 1). It is located at approximately 26 48 30 S, 30 26 30 E. Sonae is located on Portion 16 on the Farm Valschvlei 352-IT (figure 1). It is located at approximately 26 48 50 S, 30 26 38 E.

The properties are accessed via the N2 highway between Piet Retief and Ermelo (figure 2). They are located approximately 42 km north west of Piet Retief in Mpumalanga province. The region consists of forestry plantations.



Figure 1 Outline of Sonae (red) and Busby sawmills (yellow) on the farm Valschvlei 352

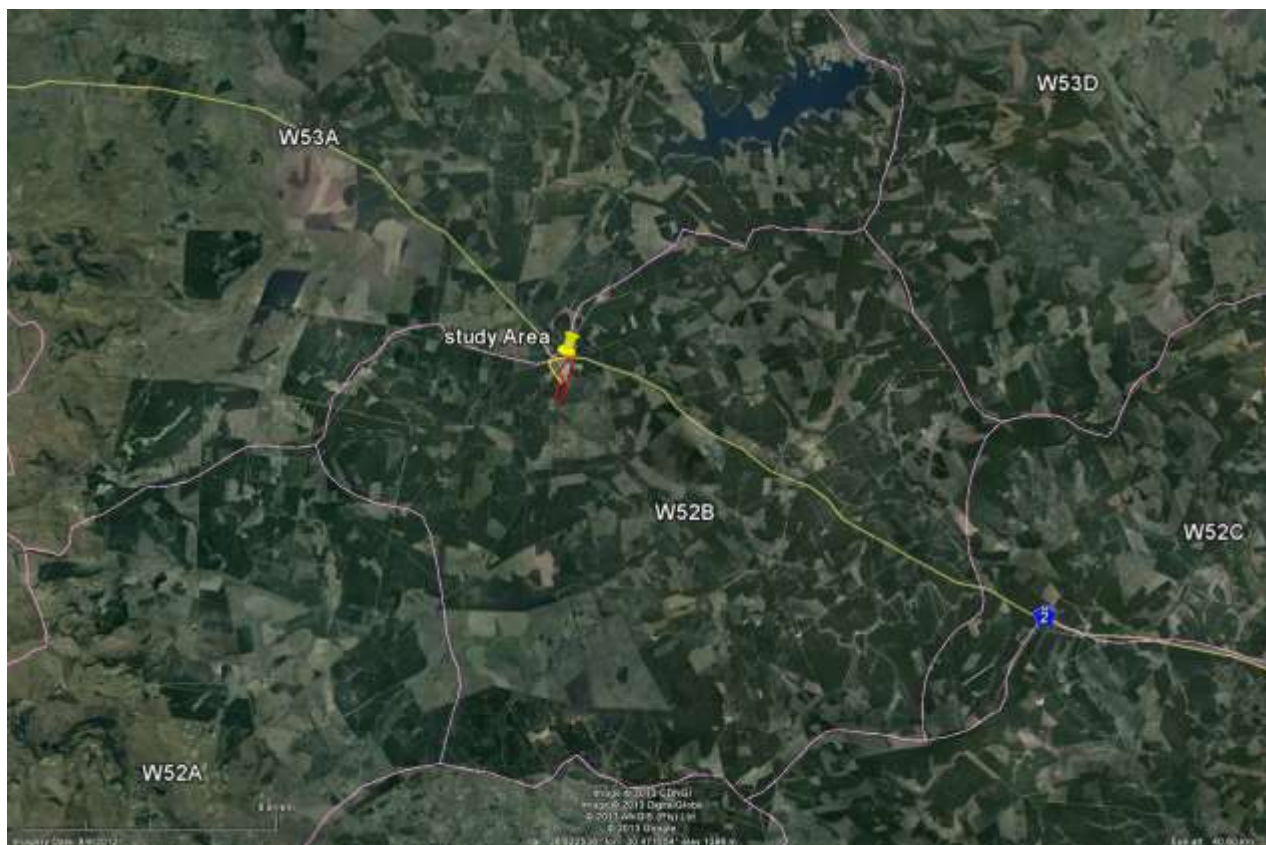


Figure 3 Quaternary catchments

2.3 CLIMATE

Rainfall data for the following rainfall station is available from 1967-2004:

Sheepmoor (4443/523) 754 mm/a

The station is located at 26 43 S, 30 18 E. Rainfall is predominantly in the summer months between October and March.

The nearest evaporation station is at Jericho Dam (W5E004), which has an annual S-span evaporation of 1511 mm/a.

2.4 GEOLOGY AND HYDROGEOLOGY

The site is underlain by horizontally bedded sedimentary medium to coarse grained sandstones and shales of the Vryheid Formation (Pv) of the Ecca Group. These lie unconformably over much older granites which outcrop to the east (Rg) (figure 4). The contact between the Vryheid Formation and underlying weathered granite can often be high yielding. Most of the farm Valschvlei lies on low yielding granites.

A NNE trending dyke (shown as a dashed blue line in figure 4) lies immediately to the east of the property, which could be a high yielding groundwater target feature.

The yield potential of the Vryheid Formation is generally low, with a median yield of 0.6 l/s and only 20% of boreholes yield more than 2 l/s. Water is generally encountered in fractures below the weathered zone, and the unconformable contact between the sandstones and the granite is high yielding.

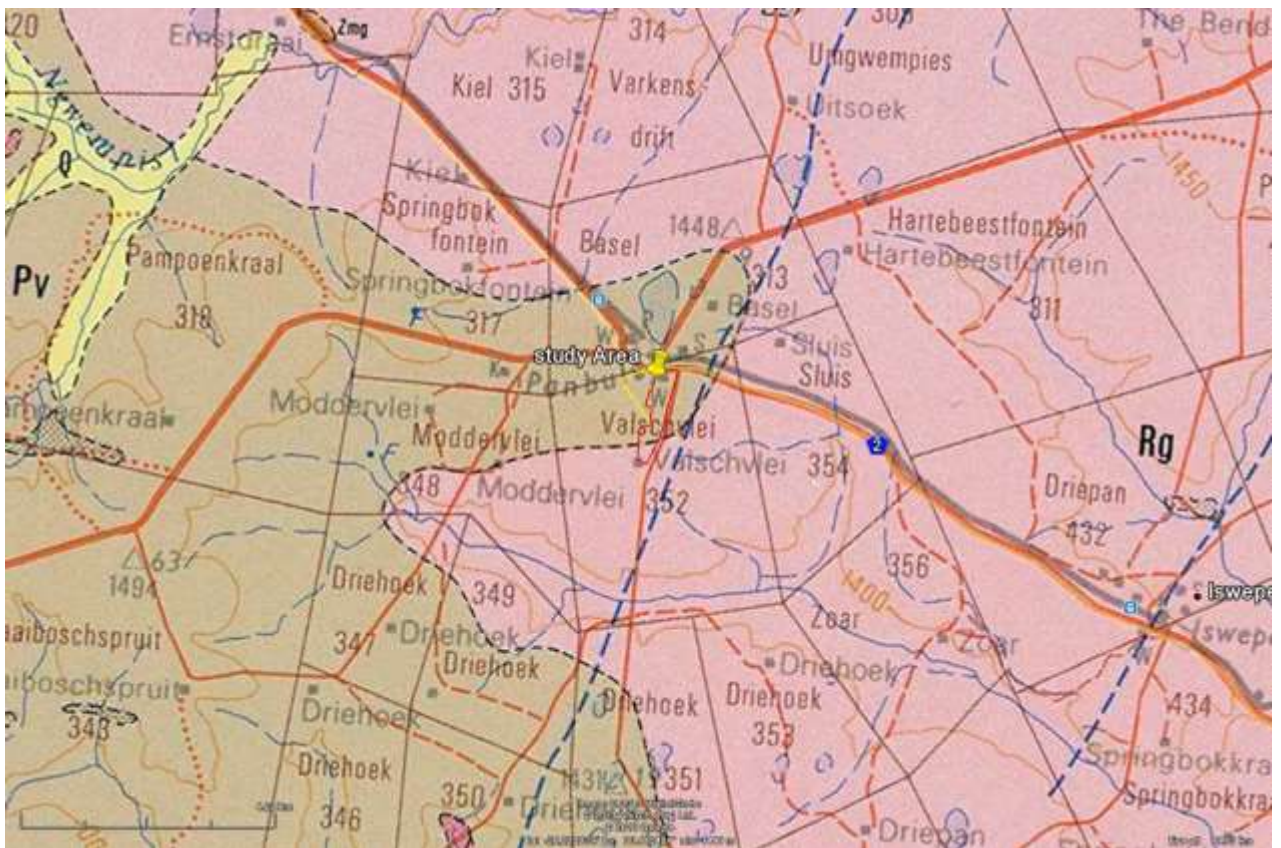


Figure 4 Geological map.

2.5 WATER DEMAND

Busby currently abstracts 52 m³/d from BH2 and BH3 (figure 5 and indicated in yellow), for domestic use and process water.

Sonae currently utilises 4 abstraction boreholes (figure 5 and indicated in red) for their wood product production and domestic use. Domestic waste water is discharged to a septic tank, while production water is recycled and no discharge occurs. Current abstraction is metred and is 22050 m³/a, or 60.5 m³/d, however demand fluctuates and peak daily demand is twice the average demand. The domestic use is approximately 24 m³/d of this total.

The future water demands agreed to by both parties are shown in table 1. The current combined demand is 117 m³/d, and the future combined demand will be 387 m³/d.

Table 1 Water demands

	Existing Use (m ³ /d)	Increase in Demand (m ³ /d)	Total future demand (m ³ /d)
Busby	52	147	199
Sonae	65	123	188

2.6 WATER SUPPLY

The location of the boreholes utilised by Busby and Sonae is shown in figure 5. Busby's BH3 is located on Sonae and accessed via a servitude.

Sonae currently utilises 4 boreholes with a supply capacity of 130.8 m³/d. They are largely reliant on BH3 (red), which has the highest capacity. The production schedule can be increased to supply 261 m³/d, hence no additional boreholes are foreseen.



Figure 5 Location of boreholes (yellow = Busby, red = Sonae)

The details for the Busby boreholes are given in table 2.

Table 2 Existing boreholes

	Pump	Depth (m)	Condition	Drive Unit
BH1	GW 0372	37.6	poor	MONO
BH2	1.1 Kw	38.8	Good	submersible
BH3	1.1 Kw	40	Good	submersible

3 GROUNDWATER RESOURCES EVALUATION

3.1 GROUNDWATER RESOURCES

The Groundwater Harvest Potential of catchment W52B is 37.3 mm/a, or 9016 m³/a for a 24.2 ha area. This is equivalent to 25 m³/d (table 3).

Harvest Potential is defined as the maximum volume of ground water that may be abstracted per area without depleting the aquifers. It is based on estimated mean annual recharge and a rainfall reliability factor, which gives an indication of the possible drought length.

The Harvest Potential represents a synthesis of the amount of groundwater in storage in an aquifer system, the recharge and the time span between these recharge events.

It is however not possible to abstract all the groundwater available. This is mainly due to economic and/or environmental considerations. The main contributing factor is the hydraulic conductivity or transmissivity of the aquifer systems. Based on average borehole yields, harvest potential is reduced by an exploitation factor to derive the exploitation potential, which is considered to be a conservative estimate of the groundwater resources available for exploitation.

The exploitation potential is 11.2 mm/a, or 2705 m³/a, or 7 m³/d for a 24.2 ha property.

Average recharge from rainfall is estimated at 47 mm/a, or 11374 m³/a, which is 31 m³/d for a 24.2 ha property. Under natural conditions, baseflow to rivers is 42 mm/a, hence it is expected that significant groundwater abstraction will reduce baseflow.

The current water demands of Sonae (65 m³/d) and Busby (52 m³/d) both already exceed their combined Harvest Potential of 90 m³/d, and the future combined water demands of 387 m³/d for Busby and Sonae is more than 400% of the recharge to both properties. Consequently, the combined abstraction will impact beyond both properties and on the surrounding lands.

Table 3 Groundwater Harvest and Exploitation Potential

	Busby		Sonae		Combined	
	Daily (m ³ /d)	Annual (m ³ /a)	Daily (m ³ /d)	Annual (m ³ /a)	Daily (m ³ /d)	Annual (m ³ /a)
Recharge	31	11374	59	21573	90	32947
Harvest Potential	25	9016	47	17101	72	26117
Exploitation Potential	7	2705	14	5130	21	7835
General Authorisation	10	3630	19	6885	29	10515

3.2 WATER USE LICENSING

The General Authorisation for groundwater abstraction, without a license being required, is 150 m³/a/ha. This is equivalent to 3630 m³/a, or 10 m³/d for Busby, 19 m³/d for Sonae, and 29 m³/d for the combined property.

The planned abstraction for both properties is therefore above the ceiling value of the General Authorisation and water use licences will be required.

The current water use registration for Busby is for 19 240 m³/a, or 52 m³/d, which equates to the General Authorisation which can be abstracted from 130 ha.

The current water use registration for Sonae is for 17 885 m³/a, or 49 m³/d, which is below their current water use and equates to the General Authorisation which can be abstracted from 119 ha.

3.3 SUSTAINABLE YIELD OF EXISTING BUSBY BOREHOLES

The three existing boreholes for Busby were tested to determine their sustainable yield. The following tests were to be undertaken at each borehole to determine sustainable pumping rates and pump sizing:

- Calibration test
- 4 x 1hr step discharge test
- 1 x12 hr constant discharge test
- 1 x 12 hr recovery test

3.3.1 Borehole 1

In the first step of the stepped discharge test at 0.21 l/s, the water level reached pump suction in 50 min with 17.9 m of drawdown. Inflows to the borehole were 0.04 l/s. This borehole is too low yielding to equip.

3.3.2 Borehole 2

The borehole was subjected to a stepped discharge test at increasing yields in order to derive parameters of borehole efficiency and to evaluate water level behaviour at various pumping rates. The borehole failed after 5 minutes during the fourth step. The results are given in Annex 2. A summary of results is given in table 4.

There is no apparent loss of efficiency at increasing pumping rates, and most of the head losses from inefficiency in the borehole occur at the lowest pumping rate due to borehole side wall factors. The borehole failed after 15 minutes during the fourth step.

After the step test, the borehole was subjected to a short calibration test, where the water level was brought down to the depth of the pump in order to determine maximum inflows. The maximum inflow at pump suction was recorded and this value was used to determine the maximum discharge in the subsequent step discharge test. The borehole failed after 15 minutes during the fourth step and had a maximum inflow of 1.12 l/s.

Table 4 Summary of test pumping results

Borehole	1			
	Discharge (l/s)	Drawdown (m)	Specific capacity (l/s/m)	Efficiency (%)
Step 1	0.36	4.26	0.085	74
Step 2	0.61	9.34	0.065	68
Step 3	1.06	13.23	0.080	92
Step 4	2.00	20.23 (pump suction)		
Borehole Depth (m)	49.6			
Pump Depth (m)	44			
Static water level (m)	23.02			
Casing height (m)	0.1			
Constant rate test (l/s)	0.76			
Final drawdown (m)	14.67			

Critical drawdown(m)	13.2
Transmissivity (m²/d)	2-6
Storativity	

Following the step test, the borehole was subjected to a 24 hour constant discharge test at a rate of 0.76 l/s to determine aquifer transmissivity, and any trends in water levels indicative of hydraulic conditions that could limit the borehole yield over the long term. The water level was allowed to recover following the step test prior to commencing the constant rate test.

Following the constant test, recovery was monitored for 12 hours, at which the water level had fully recovered.

Data from the constant rate and recovery tests were used to determine the sustainable yield of the borehole utilising methods developed and validated in fractured rock aquifers across southern and eastern Africa by Sami & Murray (1997).

The water strike appears to be at 9 m of drawdown (32 m below ground level). The water level starts to drop more rapidly after drawdown exceeds 9 m, and starts to fail when drawdown exceeds 15 m. This indicates that water levels should be kept at less than 32 m (9 m of drawdown) during long term pumping. This can be achieved by a long term pumping rate of 54 m³/d (table 5). Over the short term, the step test indicates the borehole can yield up to 1.6 l/s, but only for about 3.8 hours.

Table 5 Recommended borehole methods.

RECOMMENDED PUMPING SCHEDULE				
		Min (m3/d)	Ideal (m3/d)	Max.(m3/d)
Daily Discharge		44	54	75
	h/d	Pumping Rate (l/s)		
l/s @	12	0.7	0.9	1.2
l/s @	24	0.5	0.6	0.9
	l/s	Pumping Hours (h/d)		
Max. pumping rate	1.6	2.6	3.8	7.4

Recovery is rapid, with water levels recovering in 12 hours after 24 hours of pumping, hence the borehole can be pumped for more than 12 hours.

The borehole can generally be considered low yielding and suitable for domestic water supply and small scale irrigation. Its sustainable yield is 54 Kl/d, which is sufficient for current use at Busby, but not for the increased water demands. Recommendations with regard to borehole operation are summarised in table 6.

Table 6 Management Recommendations

Borehole	BH2
Depth of pump intake (m)	36
12 hour pumping cycle (l/s)	1.0
24 hour pumping cycle (l/s)	0.7
Maximum 12 pumping cycle (l/s)	1.3
Maximum 24 hour pumping cycle (l/s)	0.9
Maximum operating cycle (l/s)	2.3
Critical water level (m below ground)	32

3.3.3 Borehole 3

The borehole was subjected to a stepped discharge test at increasing yields in order to derive parameters of borehole efficiency and to evaluate water level behaviour at various pumping rates. The results are given in Annex 2. A summary of results is given in table 7.

There is a significant loss of efficiency when the borehole is pumped at 5 l/s, which suggests the borehole should not be pumped at more than 4 l/s.

The maximum inflow is estimated as 5.9 l/s.

Table 7 Summary of test pumping results

Borehole	1			
	Discharge (l/s)	Drawdown (m)	Specific capacity (l/s/m)	Efficiency (%)
Step 1	1.06	0.57	1.86	88
Step 2	2.03	1.26	1.61	90
Step 3	3.51	2.3	1.53	92
Step 4	5.07	3.88	1.31	84
Borehole Depth (m)	43.6			
Pump Depth (m)	38			

Static water level (m)	18.6
Casing height (m)	0.1
Constant rate test (l/s)	4.03
Final drawdown (m)	4.6
Critical drawdown(m)	4.4
Transmissivity (m²/d)	40-57

Following the step test, the borehole was subjected to a 24 hour constant discharge test at a rate of 4.03 l/s to determine aquifer transmissivity, and any trends in water levels indicative of hydraulic conditions that could limit the borehole yield over the long term. The water level was allowed to recover following the step test prior to commencing the constant rate test. Following the constant test, recovery was monitored for 14 hours, at which the water level had almost fully recovered. Data from the constant rate and recovery tests were used to determine the sustainable yield of the borehole utilising methods developed and validated in fractured rock aquifers across southern and eastern Africa by Sami & Murray (1997).

The water strike could not be determined as the borehole is high yielding and showed no signs of failure. The rate of drawdown increases after 4.4 m (23 m below ground level). This indicates that drawdown should be kept at less than 4.4 m during long term pumping. This can be achieved by a long term pumping rate of 270 m³/d (table 8). Over the short term, the step test indicates the borehole can yield up to 5.9 l/s, but only for about 7 hours.

Table 8 Recommended borehole yields.

RECOMMENDED PUMPING SCHEDULE				
		Min (m³/d)	Ideal (m³/d)	Max.(m³/d)
Daily Discharge		212	270	350
	h/d	Pumping Rate (l/s)		
l/s @	12	3.5	4.4	5.7
l/s @	24	2.5	3.1	4.1
	l/s	Pumping Hours (h/d)		
Max. pumping rate	5.9	4.2	6.8	11.4

Recovery is rapid, hence the borehole can be pumped at its maximum sustainable rate of 350 m³/d.

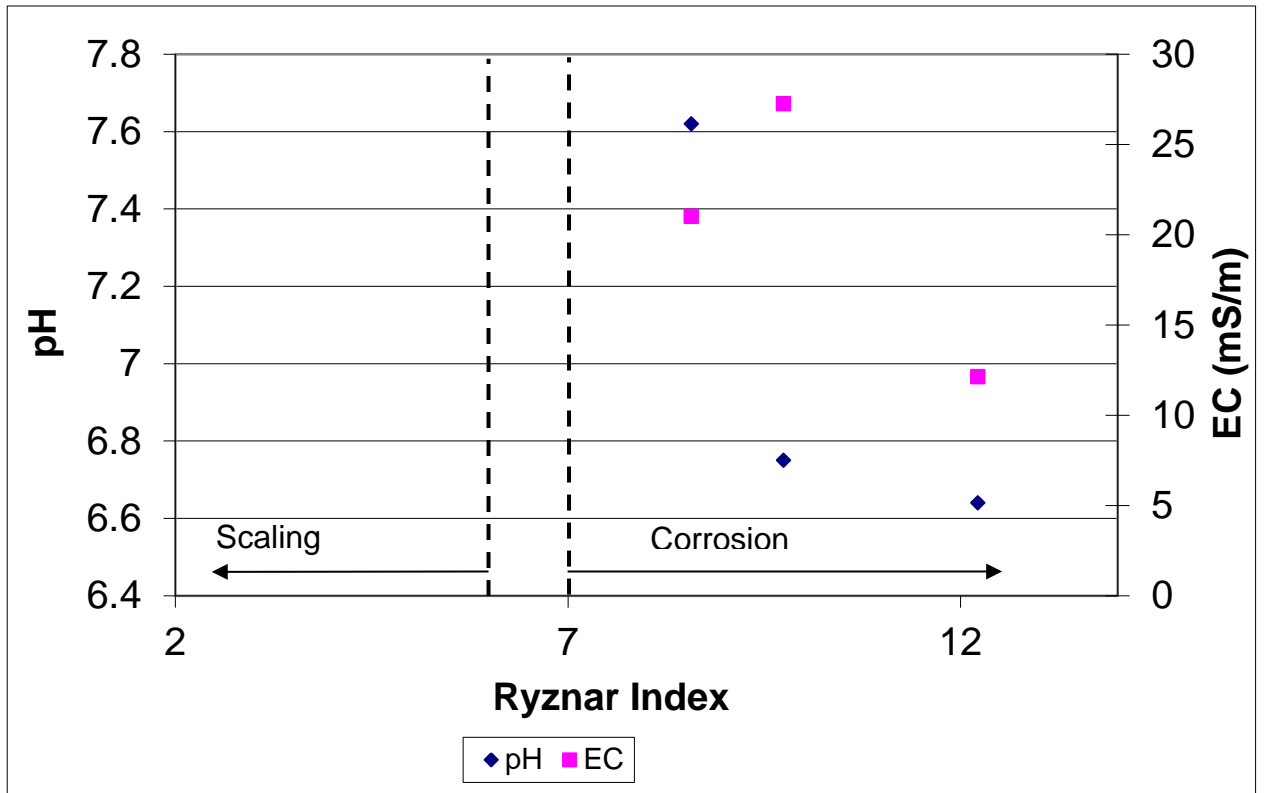


Figure 6 Ryznar Corrosivity index

4 IMPACT ON WATER LEVELS

To calculate the impact of water levels and drawdown of water levels from the cumulative abstraction on the two properties, the MODFLOW groundwater model was utilised. Drawdown is the depth to which the static water level is drawn downward due to abstraction.

The model was set up bounded by the topographic boundary to the north of the properties, and the rivers to the south and east (figure 8). A transmissivity of 10 m²/d was utilised as the mean of all the test pumping values from both properties (table 11). Data for Sonae was obtained from a geohydrological report supplied by Sonae and compiled by InSitu Groundwater Consultants (2012).

Table 11 Transmissivity values

	Busby		Sonae				Average
	BH2	BH3	BH1	BH2	BH3	BH4	
Transmissivity (m²/d)	2	40	26	37	3	1	18

A recharge of 44 mm/a, was utilised, which was calibrated to achieve the measured water levels at Busby, Sonae and surrounding properties (figure 7). It is in line with the results from the test pumping (6-40 m²/d). Groundwater levels at Busby BH3 are at 1422 mamsl, 17 mbgl, as measured in the field. Groundwater flow is to the SE.

The comparison of observed and simulated water levels is shown in figure 7. Groundwater flows towards the south east.

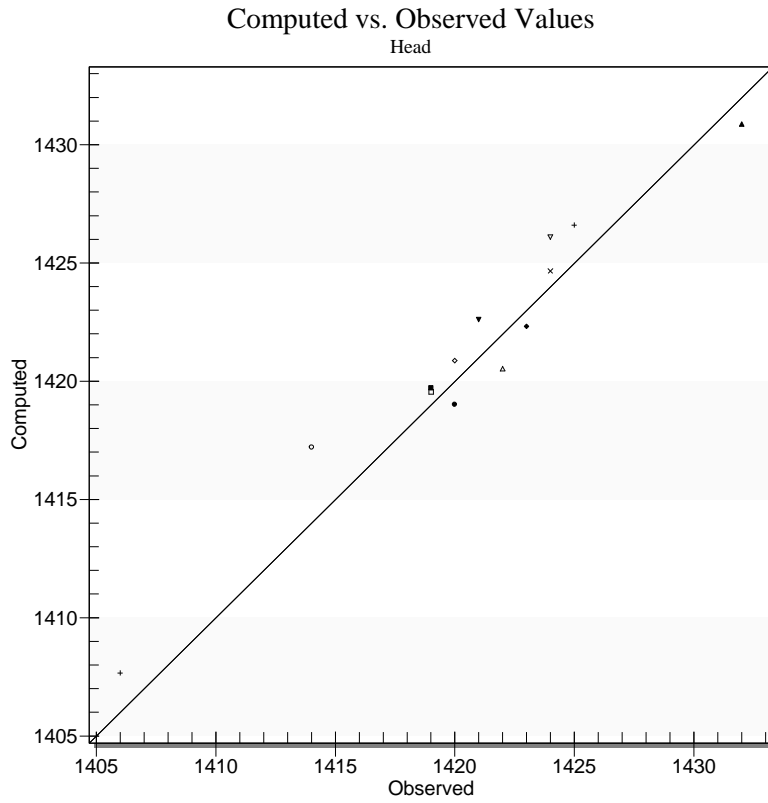


Figure 7 Observed versus simulated water levels

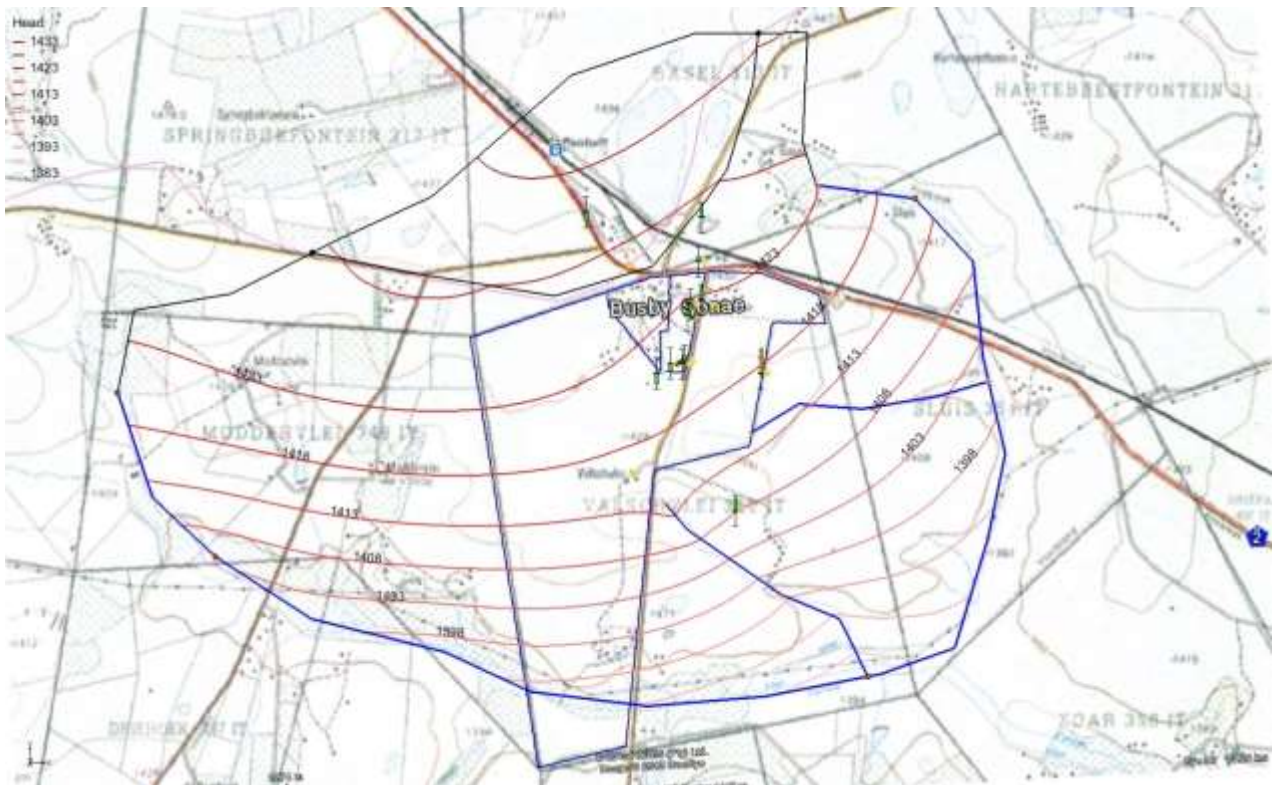


Figure 8 simulated water levels and water level observation points

Three scenarios were simulated:

1. Drawdown resulting from pumping at Sonae at the present rate of 65 m³/d and the proposed volume of 199 m³/d at Busby to evaluate the impact of Busby's planned abstraction
2. Drawdown from the combined abstraction of 387 m³/d from Busby and Sonae
3. Abstraction at the sustainable yield of 270 m³/d calculated for Busby BH3 split equally between the Busby and Sonae abstraction boreholes. 2

4.1 DRAWDOWN FROM PLANNED ABSTRACTION AT BUSBY

The model was utilised to derive water levels and drawdown from an abstraction of 199 m³/d at Busby from BH3 (figure 9), with abstraction at Sonae remaining at 65 m³/d.



Figure 9 Drawdown from an increase in abstraction at Busby to 199 m³/d

The impact on the aquifer extends beyond the property boundaries. Drawdown of water levels on Sonae is from 1.6-8.2 m above present day. Drawdown on Busby is from 2-3.9 m. The impact is greater on Sonae since the borehole is located on Sonae.

Drawdown on the Sonae boreholes is shown in table 12.

The impact on Sonae boreholes from the proposed Busby abstraction ranges from 4.1 m at BH1, the closest to the Busby abstraction borehole, to 2.1 m at BH4, the furthest away.

Table 12 Drawdown in water levels in Sonae boreholes from the proposed Busby abstraction

Sonae Borehole	Distance from Busby BH3	Abstraction by Busby only
1	89	4.1
2	118	3.7
3	431	2.3
4	540	2.1

4.2 DRAWDOWN FROM PLANNED ABSTRACTION AT BUSBY AND SONAE

The model was utilised to determine water levels and drawdown from an abstraction of 387 m³/d by Busby and Sonae (figure 10), with abstraction as shown in table 13.

Table 13 Proposed abstraction schedule

Borehole	hours	Rate (l/s)	Volume (m ³ /d)
Busby BH2	14	0.6	30.24
Busby BH3	15	3.1	167.4
Sonae BH1	15	0.8	43.2
Sonae BH2	15	1.5	81
Sonae BH3	15	1	54
Sonae BH4	15	0.2	10.8
Total			386.64

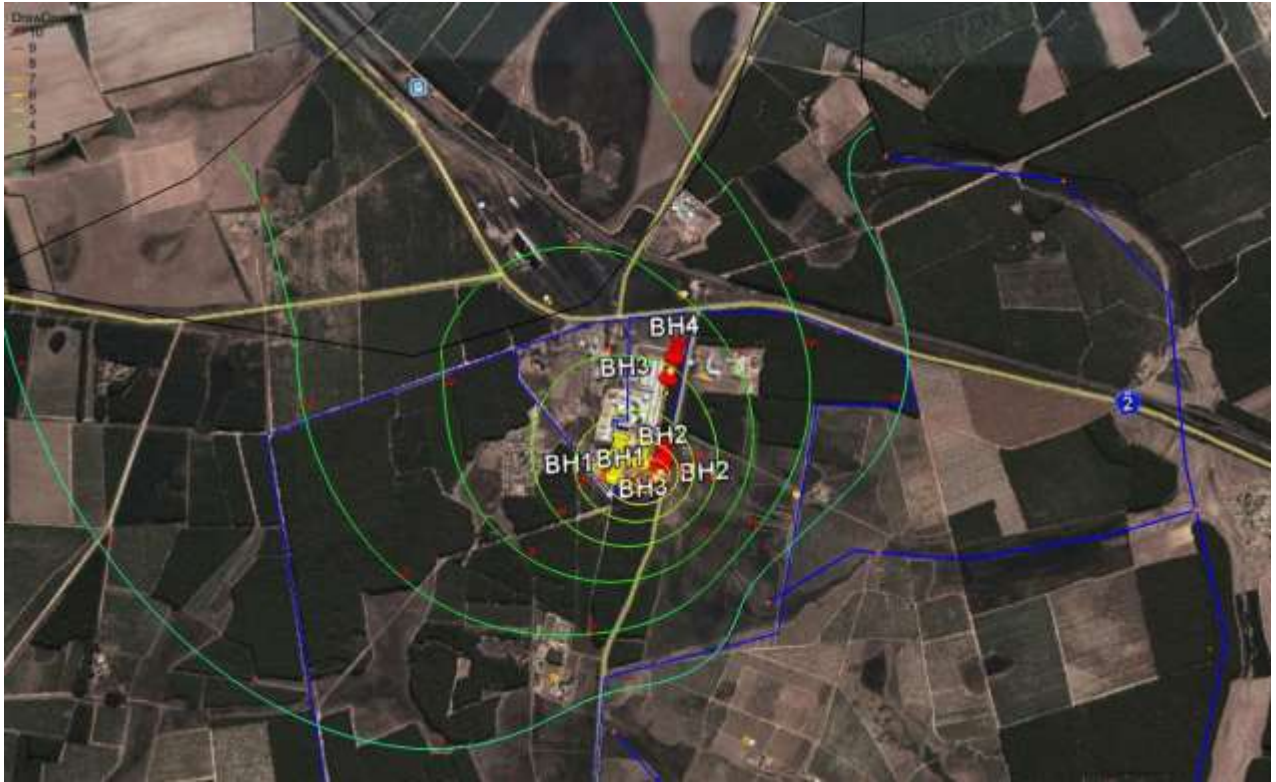


Figure 10 Drawdown from increased abstraction at Busby and Sonae

Drawdown of water levels on Sonae is from 3.1-10.2 m. Drawdown on Busby is from 3.6-6.6 m. Drawdown on the Sonae boreholes is shown in table 14.

The impact on Sonae boreholes from the proposed Busby and Sonae abstractions ranges from 8.7 m near where the main Busby and Sonae abstraction is taking place, to 4.8 m at Sonae BH3. Water levels are at 1408.5 mamsl, 29.5 mbgl in Busby BH3, from a present day 18 mbgl. The impact on the Busby borehole will probably be somewhat less as it is in very permeable zone, with a higher transmissivity than the regional 18 m²/d used in the model. Nevertheless, an abstraction of 387 m²/d results in a significant drop in water levels over both properties.

Table 14 Drawdown in water levels in boreholes from the proposed abstraction

Sonae Borehole	Distance from Busby BH3	Drawdown (m)
1	89	8.7
2	118	9.1
3	431	4.8

4	540	4.2
Busby BH3	0	10.2

4.3 DRAWDOWN AT THE ESTIMATED SUSTAINABLE YIELD

The model was run with boreholes operated at the rates in table 15, for a total of 315 m³/d. Sonae BH3 has been increased since it is the furthest from the Busby abstraction, and Sonae BH1 has been reduced. The drawdowns are shown in figure 11. Drawdowns over the properties range from 2.7-7.2 m. Since water levels are currently 17-18 mbgl, water levels would be 20-25 mbgl. The water levels in boreholes are shown in table 15.

Table 15 Sustainable abstraction schedule

Borehole	hours	Rate (l/s)	Volume (m ³ /d)
Busby BH2	12	0.6	25.92
Busby BH3	12	3.1	133.92
Sonae BH1	6	0.8	17.28
Sonae BH2	12	1.5	64.8
Sonae BH3	18	1	64.8
Sonae BH4	12	0.2	8.64
Total			315.36



Figure 11 Water level drawdowns from an abstraction of 315m³/d.

Table 16 Drawdown in water levels in boreholes from the proposed abstraction

Sonae Borehole	Distance from Busby BH3	Drawdown (m)
1	89	5.7
2	118	6.5
3	431	4.1
4	540	3.2
Busby BH3	0	7.2

5 CONCLUSIONS AND RECOMMENDATIONS

The following conclusions can be drawn:

- a) The Groundwater Harvest Potential of the Sonae and Busby sawmill properties is 72 m³/d, which is approximately equal to the current water use at Busby.
- b) The planned combined abstraction of 387 m³/d requires the Harvest Potential for 379 ha, whereas Sonae and Busby are 70 ha.
- c) Planned abstraction is above the General Authorisation for both properties, consequently, a water use license is required.
- d) The existing boreholes at Busby have a sustainable yield of 270 m³/d, however, due to increasing abstraction at Sonae, they cannot be sustainably pumped at this rate.
- e) The yield of the Sonae boreholes is 300 m³/d, however, this figure well exceeds the Harvest Potential of the properties.
- f) The impact of the proposed abstraction of 387 m³/d at Busby on Sonae results in significant drawdown if drawn from 2 boreholes, ranges from 3-10 m of drawdown over their properties, and draws water levels down to 29 mbgl in Busby BH3 from a current 18 mbgl.
- g) Pumping both properties at a combined rate of 315 m³/d draws water levels down 5-7 m below current levels.

A recommended solution to maximise water use in a sustainable manner is to initially pump at 315 m³/d across both properties at the rates given in table 17. This would provide Busby with 160 m³/d, and Sonae with 155 m³/d.

Table 17 proposed abstraction schedule

Borehole	Initial			Final		
	hours	Rate (l/s)	Volume (m ³ /d)	hours	Rate (l/s)	Volume (m ³ /d)
Busby BH2	12	0.6	25.92	12	0.6	25.92
Busby BH3	12	3.1	133.92	16	3.1	178.56
Sonae BH1	6	0.8	17.28	6	0.8	17.28
Sonae BH2	12	1.5	64.8	16	1.5	86.4
Sonae BH3	18	1	64.8	18	1	64.8
Sonae BH4	12	0.2	8.64	18	0.2	12.96
Total			315.36			385.92

Pumping should be over alternating 12 hr cycles, with the boreholes in bold pumping simultaneously, and the other boreholes pumping the other 12 hours. Water levels should be monitored weekly before turning on the pumps, and if water levels stabilise, to increase pumping hours up to a maximum of 18 hrs, as given in the final pumping schedule (table 17), to get more water until the minimum acceptable water level, or the water demand is reached. The final pumping schedule is designed to rely on boreholes the furthest away from each other in order to minimise interference. Increasing the pumping hours will increase the total volume abstracted as shown in figure 12.

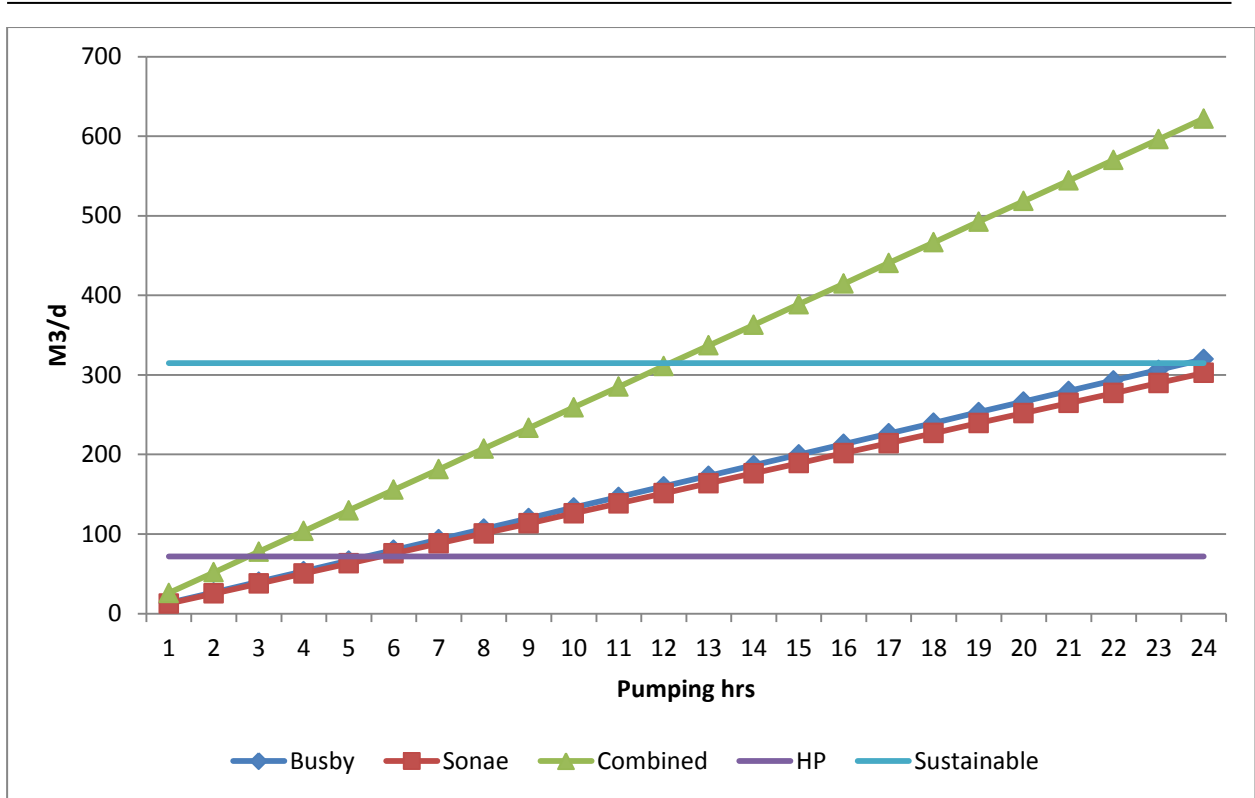


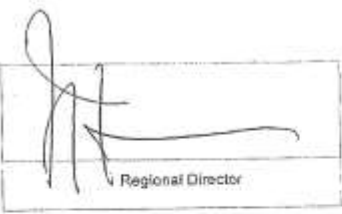
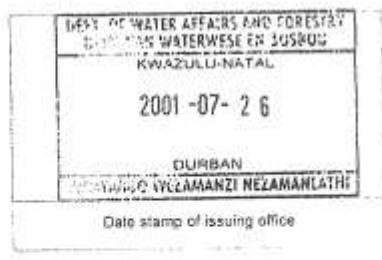


Figure 12 Relationship between pumping hours and abstraction

Water use licences for the full water demands of 199 and 188 m³/d for both properties would still have to be applied for.

K. SAMI M.Sc, Pr Sci. Nat

APPENDIX 1 – Busby Water Use Registration

	<p>DEPARTMENT OF WATER AFFAIRS AND FORESTRY</p> <p>21027791</p> <p>REGISTRATION CERTIFICATE</p> <p>ISSUED IN TERMS OF THE NATIONAL WATER ACT, 1998(ACT NO. 36 OF 1998)</p> <p>This Registration Certificate is issued to :-</p> <p>BUSBY SAWMILLS PTY LTD 195000005407 PO BOX 536 PIET RETIEF 2380</p> <p>To use water on the following property :-</p> <p>PTN 5 NO. 352 VALSCHVLEI T29164/1995</p> <p>For the water use(s) of :-</p> <p>Section 21(a) Taking water from a water resource.</p> <p>(See attached Annexure)</p>	
		
<p>Date <u>2001-07-26</u> KwaZulu Natal Region</p>		
<p>DISCLAIMER : This certificate is :- 1. not an acknowledgement of an entitlement to the registered water use; 2. issued without alterations or erasures and is invalid if it contains alterations not in conformity with the Department's official copy; and 3. In substitution of any registration certificate that may have been previously issued by the Department.</p>		

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Page 1 of 2



DEPARTMENT OF WATER AFFAIRS AND FORESTRY



Taking water from a water resource in terms of Section 21(a) of the National Water Act

Water resource: CATCHMENT OF NGWEMPISI

Source: Borehole

Total volume taken per year: 19240.00 cubic metres

Date registered: 2001-06-22

Water Use No: 1

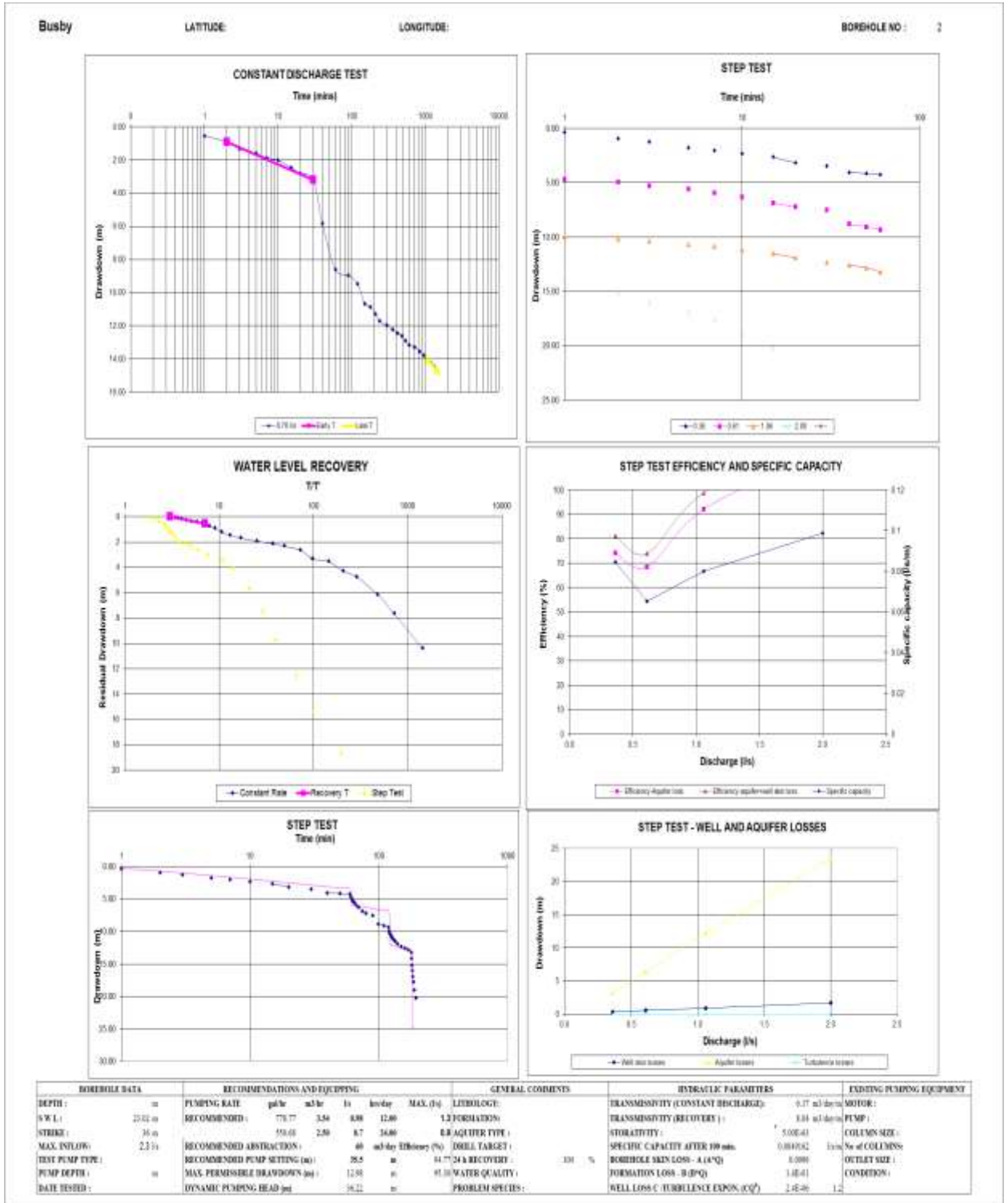
DISCLAIMER :

This certificate is :-

1. not an acknowledgement of an entitlement to the registered water use;
2. issued without alterations or erasures and is invalid if it contains alterations not in conformity with the Department's official copy; and
3. in substitution of any registration certificate that may have been previously issued by the Department.

Appendix 2 – Busby Test Pumping Data

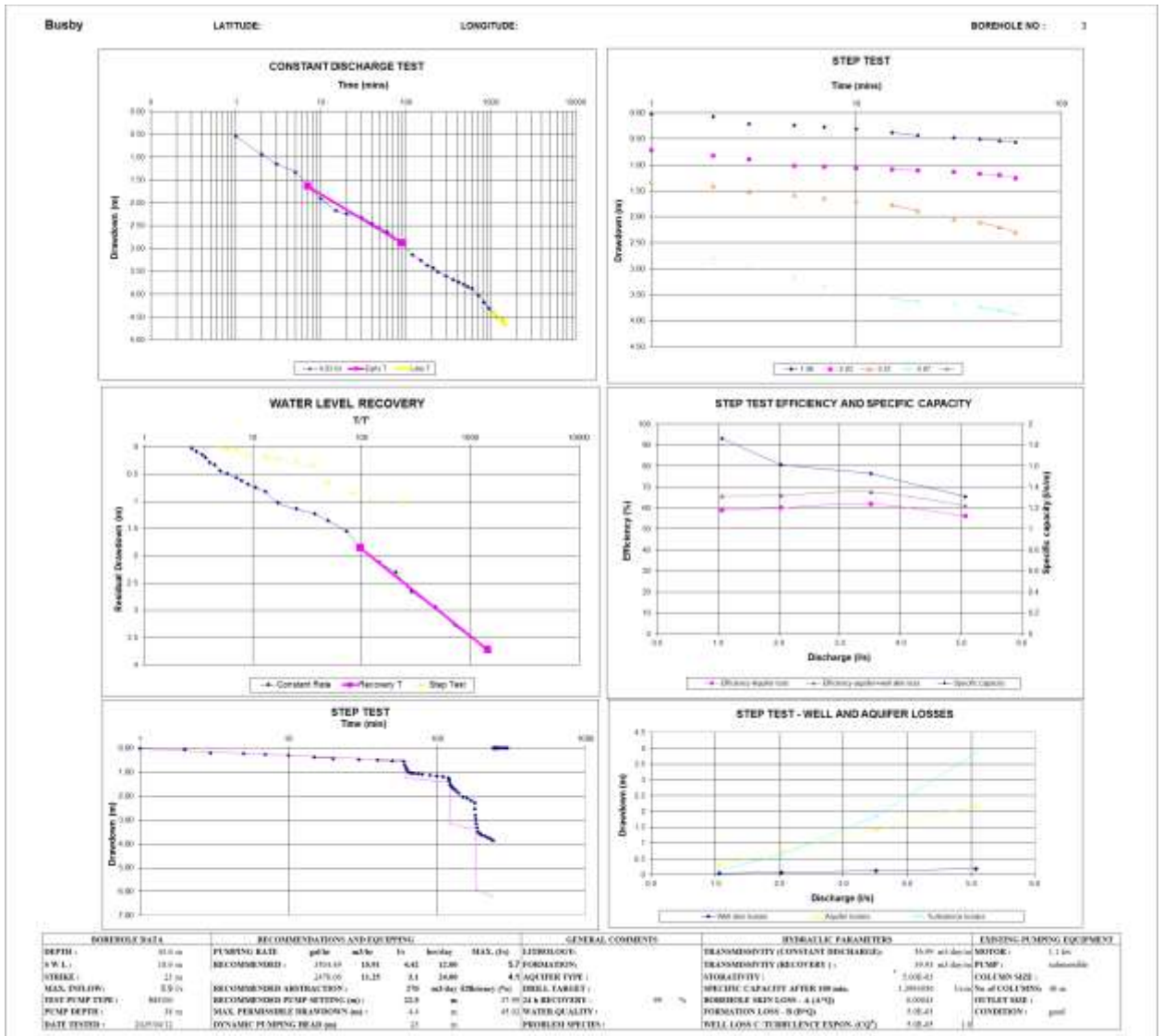
Borehole 2



Test Pumping Results Borehole 2

STEP TEST			LOCATION					Busby	No.	2	Constant Rate Test			Constant Rate Recovery		
End time (min)			60	120	180	195										
l/s			0.36	0.61	1.06	2.00			0.78							
Total time	Time (min)	Recovery (min)	Step 1	Step 2	Step 3	Step 4	Step 5	t/t'	Step Recov (m)	Time (min)	Time (d)	Drawdown (m)	Recovery (min)	Water level (m)	t/t'	
0.5	0.50	0.50						391		1.00	0.000694	0.55	1.00	10.38	1441	
1	1.00	1.00	0.36	4.67	9.95	14.13		196	18.63	2.00	0.001389	0.91	2.00	7.66	721	
1.5	1.50	1.50						131		3.00	0.002083	1.33	3.00	6.14	481	
2	2.00	2.00	0.93	4.93	10.18	15.22		98.5	15.32	5.00	0.003472	1.60	5.00	4.77	289	
2.5	2.50	2.50						79		7.00	0.004861	1.88	7.00	4.28	206.7143	
3	3.00	3.00	1.25	5.27	10.37	16.04		66	12.55	10.00	0.006944	2.02	10.00	3.53	145	
4	4.00	4.00						49.75		15.00	0.010417	2.46	15.00	3.32	97	
5	5.00	5.00	1.77	5.58	10.65	16.94		40	9.72	20.00	0.013889	2.81	20.00	2.64	73	
6	6.00	6.00						33.5		30.00	0.020833	3.20	30.00	2.33	49	
7	7.00	7.00	2.02	5.94	10.88	17.73		28.8571	7.48	40.00	0.027778	5.83	40.00	2.13	37	
8	8.00	8.00						25.375		60.00	0.041667	8.60	60.00	1.93	25	
9	9.00	9.00						22.6667		90.00	0.0625	8.95	90.00	1.7	17	
10	10.00	10.00	2.33	6.33	11.14	19.00		20.5	5.66	120.00	0.083333	9.45	120.00	1.48	13	
12	12.00	12.00						17.25		150.00	0.104167	10.65	150.00	1.22	10.6	
15	15.00	15.00	2.64	6.88	11.52	20.23		14	4.05	180.00	0.125	10.86	180.00	0.93	9	
20	20.00	20.00	3.18	7.22	11.91			10.75	3.38	210.00	0.145833	11.28	210.00	0.76	7.857143	
25	25.00	25.00						8.8		240.00	0.166667	11.70	240.00	0.55	7	
30	30.00	30.00	3.46	7.50	12.32			7.5	3.00	300.00	0.208333	11.96	300.00	0.43	5.8	
35	35.00	35.00						6.57143		360.00	0.25	12.22	360.00	0.35	5	
40	40.00	40.00	4.03	8.81	12.58			5.875	2.62	420.00	0.291667	12.43	420.00	0.28	4.428571	
50	50.00	50.00	4.16	9.06	12.84			4.9	2.28	480.00	0.333333	12.60	480.00	0.2	4	
60	60.00	60.00	4.26	9.34	13.23			4.25	2.11	540.00	0.375	12.88	540.00	0.14	3.666667	
60.5		70.00						3.78571	1.97	600.00	0.416667	13.14	600.00	0.08	3.4	
61		80.00	4.67					3.4375	1.65	720.00	0.5	13.28	720.00	0	3	
61.5		90.00						3.16667	1.30	840.00	0.583333	13.55	840.00		2.714286	
62		100.00	4.93					2.95	1.14	960.00	0.666667	13.76	960.00		2.5	
62.5		110.00						2.77273	0.88	1080.00	0.75	13.97	1080.00		2.333333	
63		120.00	5.27					2.625	0.54	1200.00	0.833333	14.2	1200.00		2.2	
64		150.00						2.3	0.31	1320.00	0.916667	14.45	1320.00		2.090909	
65		180.00	5.58					2.08333	0.13	1440.00	1	14.67	1440.00		2	
66		210.00						1.92857		210.00	0.145833		210.00		7.857143	
67		240.00	5.94					1.8125	0.02	240.00	0.166667		240.00		7	

Borehole 3



Test Pumping Results Borehole 3

STEP TEST			LOCATION					Busby		No.	3		Constant Rate Test			Constant Rate Recovery	
End time (min)			60	120	180	240											
l/s			1.06	2.03	3.51	5.07						2.92					
Total time	Time (min)	Recovery (min)	Step 1	Step 2	Step 3	Step 4	Step 5	t/t'	Step Recov (m)	Time (min)	Time (d)	Drawdown (m)	Recovery (min)	Water level (m)	t/t'		
0.5	0.50	0.50						481		1.00	0.000694	0.55	1.00	3.72	1441		
1	1.00	1.00	0.03	0.72	1.32	2.55		241	1.00	2.00	0.001389	0.94	2.00	3.27	721		
1.5	1.50	1.50						161		3.00	0.002083	1.15	3.00	2.94	481		
2	2.00	2.00	0.07	0.83	1.40	2.81		121	0.96	5.00	0.003472	1.33	5.00	2.66	289		
2.5	2.50	2.50						97		7.00	0.004861	1.64	7.00	2.31	206.7143		
3	3.00	3.00	0.21	0.90	1.52	2.98		81	0.84	10.00	0.006944	1.91	10.00	2.12	145		
4	4.00	4.00						61		15.00	0.010417	2.17	15.00	1.85	97		
5	5.00	5.00	0.24	1.02	1.58	3.16		49	0.65	20.00	0.013889	2.24	20.00	1.55	73		
6	6.00	6.00						41		30.00	0.020833	2.32	30.00	1.36	49		
7	7.00	7.00	0.28	1.04	1.64	3.33		35.2857	0.34	40.00	0.027778	2.45	40.00	1.23	37		
8	8.00	8.00						31		60.00	0.041667	2.63	60.00	1.14	25		
9	9.00	9.00						27.6667		90.00	0.0625	2.88	90.00	1.03	17		
10	10.00	10.00	0.31	1.07	1.70	3.50		25	0.28	120.00	0.083333	3.14	120.00	0.83	13		
12	12.00	12.00						21		150.00	0.104167	3.26	150.00	0.75	10.6		
15	15.00	15.00	0.38	1.09	1.77	3.58		17	0.22	180.00	0.125	3.37	180.00	0.69	9		
20	20.00	20.00	0.44	1.11	1.89	3.63		13	0.18	210.00	0.145833	3.42	210.00	0.62	7.857143		
25	25.00	25.00						10.6		240.00	0.166667	3.51	240.00	0.57	7		
30	30.00	30.00	0.48	1.14	2.05	3.68		9	0.13	300.00	0.208333	3.60	300.00	0.5	5.8		
35	35.00	35.00						7.85714		360.00	0.25	3.68	360.00	0.45	5		
40	40.00	40.00	0.51	1.17	2.11	3.74		7	0.06	420.00	0.291667	3.73	420.00	0.34	4.428571		
50	50.00	50.00	0.54	1.20	2.20	3.80		5.8	0.02	480.00	0.333333	3.79	480.00	0.29	4		
60	60.00	60.00	0.57	1.26	2.30	3.88		5	0.00	540.00	0.375	3.84	540.00	0.2	3.666667		
60.5		70.00						4.42857		600.00	0.416667	3.88	600.00	0.15	3.4		
61		80.00	0.72					4		720.00	0.5	4.03	720.00	0.09	3		
61.5		90.00						3.66667		840.00	0.583333	4.18	840.00	0.03	2.714286		
62		100.00	0.83					3.4		960.00	0.666667	4.31	960.00		2.5		
62.5		120.00						3		1080.00	0.75	4.4	1080.00		2.333333		
63		140.00	0.90					2.71429		1200.00	0.833333	4.49	1200.00		2.2		
64		160.00						2.5		1320.00	0.916667	4.54	1320.00		2.090909		
65		180.00	1.02					2.33333		1440.00	1	4.6	1440.00		2		



the dedet

Department:
Economic Development, Environment and Tourism
MPUMALANGA PROVINCIAL GOVERNMENT

Details of specialist and declaration of interest in respect of an application for authorisation in terms of the National Environmental Management Act, 1998 (Act No. 107 of 1998), as amended and the Environmental Impact Assessment Regulations, 2010

PROJECT TITLE

Busby Renewables

Specialist:
Nature of specialist study compiled:
Contact person:
Postal address:
Postal code:
Telephone:
E-mail:
Qualifications & relevant experience:
Professional affiliation(s) (if any)

K. SAMI	
Hydrogeologist. - Groundwater Investigation	
K. SAMI	
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Cell:	082 4934241
Fax:	
ksami@wsmleshika.co.za	
M.Sc 25+ years.	
Pr Sci Nat.	

The specialist appointed in terms of the Regulations

I, K. SAMI declare that -

General declaration:

- I act as the independent specialist in this application;
- I will perform the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the applicant;
- I declare that there are no circumstances that may compromise my objectivity in performing such work;
- I have expertise in conducting the specialist report relevant to this application, including knowledge of the Act, regulations and any guidelines that have relevance to the proposed activity;
- I will comply with the Act, regulations and all other applicable legislation;
- I will take into account, to the extent possible, the matters listed in Regulation 8;
- I have no, and will not engage in, conflicting interests in the undertaking of the activity;
- I undertake to disclose to the applicant and the competent authority all material information in my possession that reasonably has or may have the potential of influencing - any decision to be taken with respect to the application by the competent authority; and - the objectivity of any report, plan or document to be prepared by myself for submission to the competent authority;
- All the particulars furnished by me in this form are true and correct; and
- I realise that a false declaration is an offence in terms of Regulation 71 and is punishable in terms of section 24F of the Act.

K. SAMI
Signature of specialist:

WSM Leshika Pty Ltd.
Name of company:

6/6/13
Date:

[Signature]
Signature of Commissioner of Oaths

Date: COMMISSIONER OF OATHS
IAN IZAK VAN NIEKERK

Designation: CA (SA)

Official stamp (below) COMMISSIONER OF OATHS (RSA)

84B PHYLLITE AVENUE

ZWARTKOP EXTENSION 5

CENTURION

APPENDIX 4:

Environmental Management Plan (EMP)



EON Consulting

Busby Environmental Management Plan (EMP)

Farmsecure Energy

14 June 2013

Draft 2

ENABLING
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1. Introduction

The project is a joint venture between Farmsecure Energy (Pty) Ltd and the sawmill, J&J Timbers (Pty) Ltd, run in an SPV named Busby Renewables (Pty) Ltd. Farmsecure Energy is the majority shareholder who will develop, implement, operate and maintain the project.

The Busby Renewables project is a biomass-based renewable energy project activity that, through the installation of a cogeneration plant at the site of an existing sawmills (Busby Sawmill), will produce electricity for supply to the grid. The project activity will also supply thermal energy to the sawmill.

The project will utilise wood chips and sawdust as well as off-cuts from the sawmill, currently burnt in low pressure steam boilers for the drying kilns. Additionally, plant residues from existing plantations will be collected and utilised to generate electricity for supply to the national grid. The boiler will be dry-cooled. Implementation of the project will enable the project to claim carbon credits under the Clean Development Mechanism.

The purpose of this Environmental Management Plan (EMP) is to formulate mitigatory measures that should be made binding on all parties involved with the planning, construction and operation of the proposed installations. The point of departure for this EMP is to take a proactive approach by addressing potential problems before they occur. This should limit corrective measures needed during the construction and operational phases of the development. Additional mitigation will be included throughout the project's various phases as necessary. This EMP addresses pre-construction/planning, construction and operational phases of the development.

2. Legislation, Guidelines and Policies

During the compilation of this EMP, the following documents were consulted:

2.1. Constitution of the Republic of South Africa (Act No 108 of 1996)

Section 24 states that:

“Everyone has the right to an environment that is not harmful to their health or well-being; and (b) to have the environment protected, for the benefit of present and future generations, through reasonable legislative and other measures that prevent pollution and ecological degradation; promote conservation; and secure ecologically sustainable development and use of natural resources while promoting justifiable economic and social development”.

This right overarches all development within South Africa.

2.2. National Environmental Management Act (Act No 107 of 1998)

The National Environmental Management Act 107 of 1998 (NEMA) establishes a set of principles, which all authorities have to consider when exercising their powers during the granting of permits. The principles underpinning environmental management contained in the

NEMA, as stated in Section 2 are that sustainable development requires the consideration of all relevant factors including the following:

- That the disturbance of ecosystems and loss of biological diversity are avoided, or where they cannot be altogether avoided, are minimised and remedied
- That pollution and degradation of the environment are avoided, or, where they cannot be altogether avoided, are minimised and remedied
- That the development, use and exploitation of renewable resources and the ecosystems of which they are a part do not exceed the level beyond which their integrity is jeopardised
- That negative impacts on the environment and on people's environmental rights be anticipated and prevented, and where they cannot be altogether prevented, are minimised and remedied
- Development must be socially, environmentally and economically sustainable
- Environmental management must be integrated and acknowledge that all elements of the environment are linked and interrelated, and it must pursue the best practicable environmental option
- People and their needs must be placed at the forefront of its concern, and serve their physical, psychological, developmental, cultural and social interests equitably.

Section 28(1) states that: "every person who causes, has caused or may cause significant pollution or degradation of the environment must take reasonable measures to prevent such pollution or degradation from occurring, continuing or recurring". If such degradation/pollution cannot be prevented, then appropriate measures must be taken to rectify or minimise such pollution. These measures may include, but are not limited to:

- Assessing the impact of the project or development on the environment
- Informing and educating employees about the environmental risks of their work and possible ways of minimising such risks
- Ceasing, adapting or controlling actions which cause pollution/degradation
- Preventing movement of pollutants
- Eliminating the pollution source
- Remedying the effects of the pollution.

For this reason Regulations have been published which lists activities for which environmental impact assessments is required. The Environmental Impact Assessment Regulations in terms of Chapter 5 of the National Environmental Management Act (NEMA) (Act no. 107 of 1998) were promulgated on 18 June 2010. Regulations R544, R545 and R546 contain listed activities which may not commence without prior authorisation by the competent authority.

The Busby Project in its current form and extent of activities does not contain any activities listed under the Regulations, as has been confirmed by the Department of Environmental Affairs. However, the responsible parties must take cognisance of the requirement for an

environmental authorisation, should any of the activities listed in the NEMA associated regulations (R544, R545 and R546) be planned or the need for such activities arise during any of the planning, construction, operation and decommissioning phases.

2.3. National Water Act (Act No 36 of 1998)

Water use is controlled by the National Water Act (Act no 36 of 1998)(NWA) and the enforcing authority is the Department of Water Affairs (DWA). The NWA recognises that water is a scarce resource in South Africa and its provisions are aimed at achieving sustainable use of water to the benefit of all users. The provisions of the Act are thus aimed at discouraging pollution and waste of water resources. According to Section 21 of the National Water Act the following activity is considered a use, and therefore requires a permit:

a. Taking water from a water resource

An application for a water use licence for the taking of water from a resource will be submitted to the DWA. The Busby Project in its current form and extent of activities does not require a water use licence for any other water uses as listed under Section 21 of the NWA.

2.4. National Environmental Management Waste Act (Act 59 of 2008)

In July 2009, the National Environmental Management Waste Act (Act 59 of 2008) came into effect. This Act requires that any holder of waste must take all reasonable measures to –

- avoid the generation of waste and where such generation cannot be avoided, to minimise the toxicity and amounts of waste that are generated
- re-use, recycle or recover waste
- where waste must be disposed of, to ensure that the waste is treated and disposed of in an environmentally sound manner
- manage the waste in such a manner that it does not endanger health or the environment or cause a nuisance through noise, odour or visual impacts
- within that person's power, prevent any other person from contravening a provision of this Act in respect of the waste
- take reasonable measures to prevent the waste from being used for an unauthorised purpose.

The Minister published a list of waste management activities which require authorisation under the Act. Government Notice R718 of 3 July 2009 lists Category A and Category B waste activities which requires any person undertaking such activities to perform a Basic Assessment Process or Scoping / EIA Process respectively. No person may commence, undertake or conduct a waste management activity listed in the GN R718 unless a license is issued in respect of that activity.

With the information at hand there are no activities associated with the establishment of the Busby Project that will require a Waste Management License Application.

GN 779 of 2012

The new draft list of waste management activities that are, or are likely to have a detrimental effect on the environment (GN 779 of 2012) has been published for comment during September 2012.

With the information at hand there are no activities associated with the establishment of the Busby Project that will require a Waste Management License Application in future, should the draft Regulations be promulgated (and remained unchanged). Note that the observation is based on the letter of confirmation received from the Department of Environmental Affairs (Ref. Nr 14/12/16/3/1/6) with respect to the proposed activities at the Busby Plant – with special referral to the land application of ash and the use of plantation and saw mill residue for the generation of electricity.

2.5. The National Heritage Resources Act (Act 25 of 1999)

The protection and management of South Africa's heritage resources are controlled by the National Heritage Resources Act. South African National Heritage Resources Agency (SAHRA) is the responsible authority for implementing the National Heritage Resources Act (NHRA) (No. 25 of 1999).

Section 38(1) of the National Heritage Resources Act (NHRA) (No. 25 of 1999) lists development activities that would require authorisation by the responsible heritage resources authority. The Act states that the following activities will require a heritage impact assessment:

(a) The construction of a road, wall, power line, pipeline, canal or other similar form of linear development or barrier exceeding 300m in length.

The Busby Project in its current form and extent of activities does not contain any activities listed under this Act.

2.6. The National Environmental Management: Air Quality Act (NEMAQA), Act 39 of 2004 and GN 248 of 31 March 2010

The NEMAQA represents a distinct shift from exclusively source-based air pollution control to holistic and effects based air quality management. It focuses on the adverse impacts of air pollution on the ambient environment and sets standards to control ambient air quality levels. At the same time it sets emission standards to minimise the amount of pollution that enters the environment.

The purpose of the Act is to reform the law regulating air quality in order to protect the environment by providing reasonable measures for the prevention of pollution and ecological degradation and for securing ecologically sustainable development while promoting justifiable economic and social development. It also allows for:

- national norms and standards regulating air quality monitoring
- management and control by all spheres of government

- for specific air quality measures and for matters incidental thereto
- the minimisation of pollution through vigorous control, cleaner technologies and cleaner production practices is key to ensuring that air quality is improved.

The national ambient air quality standards (GN 1210) were promulgated on 24 December 2009, and stipulate maximum ambient levels of various pollutants, including:

- Sulphur Dioxide
- Nitrogen Dioxide
- Ozone
- Particulate Matter (PM₁₀, and Pm_{2.5} (as promulgated on 29 June 2012)
- Benzene
- Carbon Monoxide
- Lead.

The Busby Project in its current form and extent of activities does not contain any activities requiring an air emission licence under the NEMAQA. It is an imperative however, that emissions from the boiler operations do not contribute to deterioration in air quality and stack emission limits must therefore be set with cognisance of the National Ambient Air Quality Standards.

2.7. Notice 309 of 2011: National Environmental Management: Air Quality Act, 2004 (Act No. 39 of 2004): Draft National Dust Control Regulations

Draft Dust regulations were promulgated, which states that no person may conduct any activity in such a way as to give rise to dust in such quantities and concentrations that -

(1) The dust or dust fall, has a detrimental effect on the environment including health, social conditions, economic conditions, ecological conditions or cultural heritage, or has contributed to the degradation of ambient air quality beyond the premises where it originates; or

(2) The dust remains visible in the ambient air beyond the premises where it originates: or,

The dust fall' at the boundary or beyond the boundary of the premises where it originates exceeds:

(a) 600 mg/m²/day averaged over 30 days In residential and light commercial areas measured using reference method ASTM 01739; or

(b) 1200 mg/m²/day averaged over 30 days in areas other than residential and light commercial areas measured using reference method ASTM 01739.

Although not promulgated at the time of the compilation of this EMP, it is recommended that dust control measures be instituted to ensure alignment with the Regulations when promulgated. Dust control should also be instituted based on the spirit of NEMA and to avoid causing a dust nuisance for neighbours.

3. About the EMP

This EMP addresses pre-construction/planning, construction and operational and decommissioning phases of the proposed development.

Note that with the exception of a Water Use Licence, the Department of Environmental Affairs confirmed that some aspects related to the project is exempt from the need for an environmental impact assessment (use of sawmill and planation residue as well as the application of boiler ash to land). However, the responsible parties must take cognisance of the requirement for an environmental authorisation, should any of the activities listed in the NEMA associated regulations (R544, R545 and R546) be planned or the need for such activities arise during any of the planning, construction, operation and decommissioning phases.

3.1. Phases of the Project

3.1.1. The pre-construction planning phase

Some of the aspects pertaining to the proposed development are conceptual and detail design must still be undertaken. This is therefore an ideal opportunity to incorporate pro-active environmental management measures into the design phase.

Pro-active environmental measures minimise the likelihood and extent of impacts. There is still the chance of accidental impacts occurring; however, through the incorporation of mitigation measures from this EMP during the planning phase, the necessary corrective actions can be taken to limit further potential impacts.

3.1.2. The construction phase

The bulk of the impacts during this phase will have an immediate effect. These may be in the form of noise and dust, and so forth. If the site is monitored on a continual basis during the construction phase, it is possible to identify these impacts as they occur. These impacts can then be mitigated through the contingency plans identified in the planning phase, together with a commitment to sound environmental management from the contractors involved with this phase of the project.

A method statement template is attached. This is to be completed for all areas that require method statements in terms of the EMP. The purpose of the method statements is to ensure that contractors plan their work appropriately in an effort to minimise impacts and to allow for an opportunity for inputs into the planned methodology by relevant environmental personnel before the deployment of workers.

3.1.3. The operational phase

By taking pro-active measures during the planning and construction phases, potential environmental impacts emanating during the operational phase will be minimised. This, in turn, will minimise the risk and reduce the monitoring effort required, but it does not make monitoring obsolete. Monitoring of certain sensitive issues such as air quality, will still be required.

3.2. Role Players and Responsibility Matrix

In order for the EMP to be successfully implemented, all the role players involved in the project need to co-operate. For effective co-operation, role players must have a clear understanding of their roles and responsibilities related to the project. They must also be professional, form respectful and transparent relationships, and maintain open lines of communication. The EMP therefore defines role players to be involved and indicates their role in the implementation of the EMP. Role players are however project specific and two different functions can be fulfilled by one individual.

Typically, these role players or the project team may include the Authorities (A), Other Authority (OA), Developer/Proponent (D), Consulting Engineers (CE), Resident Engineer (RE), Environmental Officers (EO), Environmental Control Officer (ECO), Project Manager (PM), Contractors (C). Furthermore; landowners, interested and affected parties and the relevant environmental and project specialists are also important role players.

The table below gives an indication of the functions and responsibilities of the project team.

Table 1: Project Team Responsibilities matrix

KEY	FUNCTION	RESPONSIBILITY
D	Developer/ Owner	Proponent ultimately accountable for ensuring compliance to the EMP and any conditions that may be contained in any Environmental Authorisation (EA). The ECO must be contracted by the developer (full time or part time depending on the size of the project) as an independent appointment to objectively monitor implementation of relevant environmental legislation, conditions of any Environmental Authorisations (EA's), and the EMP for the project. The developer is further responsible for providing and giving authorisation to enable the ECO to perform these responsibilities. The developer must ensure that the ECO is integrated as part of the project team.
CE	Consulting Engineer	This individual is contracted by the developer to design and specify the project engineering aspects. Generally the engineer runs the works contract. The CE may also fulfil the role of Project Manager on the proponent's behalf (See PM).
PM	Project Manager	The Project manager has over-all responsibility for managing the project, contractors, and consultants and for ensuring that the environmental management requirements are met. The CE may also act as the PM. All decisions regarding environmental procedures must be approved by the PM. The PM has the authority to stop any construction activity in contravention of the EMP consistent with a warning from the A, AO, EO, or ECO.

KEY	FUNCTION	RESPONSIBILITY
RE	Resident Engineer	<p>This individual is the consulting engineer’s representative on site. He/She has the power/mandate to issue site instructions and in some instances variation orders to the contractor, following request from the EO or ECO. The RE oversees site works and liaises with the Contractor and ECO.</p> <p>If the RE is deemed to be suitably experienced, have the relevant qualifications and is competent in the environmental aspects of construction related methods and practices, the RE and EO responsibilities can be held by one person.</p>
EO	Environmental Officer	<p>This individual is appointed by the Consulting Engineers as their environmental representative for the site operations. The EO is not independent but must act on behalf of the consulting engineers with the mandate to enforce compliance as per the project contract, which must include compliance with the EMP. The EO has the mandate to issue non-conformance notices. Furthermore, in terms of accepted industry practice, the EO could issue the equivalent of a “cease works” instruction only in exceptional circumstances where serious environmental harm has been or is about to be caused. This is in cases of extreme urgency and only when the RE is absent. In general, the EO must inform the RE of possible environmental transgressions who will then initiate the required action with the contractor.</p> <p>The EO must form part of the project team and be involved in all aspects of project planning that can influence environmental conditions on the site.</p> <p>The EO must attend relevant project meetings, conduct daily inspections to monitor compliance with the EMP, and be responsible for providing reports and feedback on potential environmental problems associated with the development to the project team and ECO.</p> <p>The EO shall convey the contents of this EMP to the Contractor and site team and discuss the contents in detail with the Contractor as well as undertake to conduct an induction and an environmental awareness training session prior to site handover to all contractors and their workforce.</p> <p>The EO must update the EMP when relevant.</p> <p>The EO must be suitably experienced with the relevant qualifications and preferably competent in construction related methods and practices.</p>

KEY	FUNCTION	RESPONSIBILITY
ECO	Environmental Control Officer	<p>The ECO is an independent person appointed to objectively monitor implementation of relevant environmental legislation, conditions of any Environmental Authorisations (EA's), and the EMP for the project.</p> <p>The ECO must conduct compliance audits to determine compliance with relevant environmental legislation, conditions of EA's and the EMP for the project. The size and sensitivity of the development, based on the EIA, will determine the frequency at which the ECO will be required to conduct audits.</p> <p>The ECO shall be the liaison between the relevant authorities and the project team. The ECO must communicate and inform the developer and consulting engineers of any changes to environmental conditions as required by relevant authoritative bodies. The ECO must ensure that the registration and updating of all relevant EMP documentation is carried out.</p> <p>The ECO must be suitably experienced with the relevant environmental management qualifications and preferably competent in construction related methods and practices.</p> <p>The ECO must handle information received from whistle blowers as confidential and must address and report these incidences to the relevant authority as soon as possible.</p> <p>On small projects, where no EO is appointed, the ECO shall convey the contents of this EMP to the Contractor site team and discuss the contents in detail with the Contractor as well as undertake to conduct an induction and an environmental awareness training session prior to site handover, to all contractors and their workforce.</p>
C	Contractor	<p>The principle contractor, hereafter known as the 'Contractor', is responsible for implementation and compliance with the requirements of the EMP and conditions of the EA's, contract and relevant environmental legislation. The Contractor must ensure that all sub-contractors have a copy of and are fully aware of the content and requirements of this EMP.</p> <p>The contractor will be required, where specified to provide Method Statements setting out in detail how the management actions contained in the EMP will be implemented. These method statements must be adhered</p>
A	Lead Authority	<p>The authorities are the relevant environmental department that has issued the Environmental Authorisation (EA) for associated water use. The authorities are responsible for ensuring that the monitoring of the EMP and other authorisation documentation is carried out. This will be achieved by reviewing audit reports submitted by the ECO and conducting regular site</p>
OA	Other Authority	<p>Other authorities are those that may be involved in the approval process of an EMP. Their involvement may include reviewing EMP's to ensure the accuracy of the information relevant to their specific mandate.</p>

3.3. Contractor Environmental Method Statements

Method Statements are written submissions to the Engineer by the Contractor, in collaboration with his/her ESO, in response to a request by the EO and or Engineer. The method statements set out the plant, materials, labour and the method that the contractor proposes using to carry out an activity, identified by the EO and/or Engineer. The Method Statements contain the appropriate detail such that the EO and Engineer are able to assess whether the Contractor's proposal is in accordance with the requirements of the EMP. The Contractor must sign each Method Statement along with the EO and Engineer to formalise the approved Method Statement.

All Method Statements including those which may be required as *ad hoc* or emergency construction method statements must be submitted to the Engineer for approval prior to the commencement of the activity. Any changes to the method of works must be reflected by amendments to the original approved Method Statement. Any changes in this regard must be approved by the EO and Engineer on the understanding that such changes are environmentally acceptable and in line with the requirements of this EMP.

Method statements for the following activities must be submitted to the EO, ECO and Engineer for approval before construction commences:

- Solid/waste management
- Cement and concrete batching
- Dust control
- Hydrocarbon and emergency spills procedures
- Sourcing, excavating, transporting and dumping of fill and spoil material
- Topsoil management
- Fire
- Rehabilitation of disturbed areas
- Storm water management plan
- Rehabilitation plan.

3.3.1. Site documentation

The following is a list of documentation that must be kept on site and must be made available to the ECO and/or government departments on request.

- Access negotiations and physical access plan
- Site daily diary /instruction book/ Incident reports
- Records of all remediation / rehabilitation activities
- Copies of EO reports (management and monitoring)
- Copies of the relevant environmental authorisations (including a full set of documentation submitted for authorisation)
- Environmental Management Plan (EMP)
- Complaints register

- Contact details of relevant emergency response teams
- Method statements.

3.3.2. Pro forma documentation

Prior to the commencement of construction activities

The following attached *pro forma* documentation is to be filled out and is binding to the EMP and project contract and includes, but is not limited to the following:

- Declaration of understanding by the Developer
- Declaration of understanding by the Engineer
- Declaration of understanding by the Contractor
- Method statements
- ECO / Engineer approval for method statements.

During construction activities

The following attached pro forma documentation is to be filled out and maintained. These are binding to the EMP and project contract. They include, but are not limited to, the following:

- Amended Method Statements
- ECO / Engineer approval for amended method statements
- Environmental incidents
- Records of all remediation / rehabilitation activity (if and when applicable).

3.4. Safety and security

The Security Personnel will not allow the entrance of non-authorized persons on-site and will help maintain surveillance of any hazardous materials stored on site.

The staff will be provided with the necessary equipment for personal protection, including steel toed leather boots, hardhats, earplugs, safety glasses, gloves and protective clothing (shirts, trousers, vests, aprons, etc.). The staff will be provided with rain protection as needed. Protective equipment for employees working in confined spaces or in environments with hazardous fumes (such as those from welding operations) will also include respirators or filtration systems, as necessary.

4. Environmental Management Plan for all project phases

The following tables detail the EMO for the Pre-Construction, Construction and Operation and Decommissioning Phases:

Table 1: Pre-Construction Phase Mitigation Measures

4.1. Pre-Construction				
MITIGATION MEASURE	MANAGEMENT OBJECTIVES	MEASURABLE TARGETS	RESPONSIBLE PARTY	FREQUENCY OF ACTION
<p>4.1.1. Project contract and programme</p> <p>The EMP must be included as part of the tender documentation. This will ensure that recommendations and constraints, as set out in this document are enforceable under the general conditions of the contract. This will also ensure that contractor's budget is appropriately for environmental management measures that must be implemented.</p> <p>A copy of this EMP must be available on site. The Contractor shall ensure that all the personnel involved on site, sub-contractors and their team and suppliers are familiar with and understand the specifications contained in the EMP.</p>	<ul style="list-style-type: none"> Contingencies for minimising negative impacts anticipated to occur during the construction phase Ensure environmental awareness and formalise environmental responsibilities and implementation 	<ul style="list-style-type: none"> Contract records Signed declaration pro formas 	Project team	As required

Pre-Construction				
MITIGATION MEASURE	MANAGEMENT OBJECTIVES	MEASURABLE TARGETS	RESPONSIBLE PARTY	FREQUENCY OF ACTION
<p>4.1.2. Appointments and duties of project team</p> <p>The contact details for the ECO, RE, EO and Contractor shall be completed on the attached pro forma and a copy kept on site (as applicable).</p> <p>Before construction activities commence, role players must have a clear indication as to their role in the implementation of this EMP as indicated in Table 1.</p> <p>Subcontractor(s) contracts with the principle contractor must contain a clause to the effect that the disposal of all construction-generated refuse/waste to an officially approved dumping site is the responsibility of the subcontractor in question and that the subcontractors are bound to the management activities as stipulated in this EMP.</p>	<ul style="list-style-type: none"> Contingencies for minimising negative impacts anticipated to occur during the construction phase 	<ul style="list-style-type: none"> Contract records Signed declaration pro formas 	Project team	Once off

Pre-Construction				
MITIGATION MEASURE	MANAGEMENT OBJECTIVES	MEASURABLE TARGETS	RESPONSIBLE PARTY	FREQUENCY OF ACTION
<p>4.1.3. Method statements</p> <p>All activities which require method statements, as set out above may only commence once the method statements have been approved by the engineer and/or ECO.</p> <p>Where applicable, the contractor shall provide job-specific training on an <i>ad hoc</i> basis when workers are engaged in activities, which require method statements.</p>	<ul style="list-style-type: none"> Contingencies for minimising negative impacts anticipated to occur during the construction phase 	<ul style="list-style-type: none"> Approved method statements and relevant pro forma documents Training records 	Contractor, Engineer	As and when required
<p>4.1.4. Environmental Awareness Training</p> <p>Within seven days of the Commencement Date, the Contractor's site staff including foremen and site management staff shall attend an environmental awareness training course, of approximately one-hour duration. The Contractor shall liaise with the Engineer prior to the Commencement Date to fix a date and venue for the course. The Contractor shall provide a suitable venue with facilities as required by the Specification Data, and ensure that the specified employees attend the course.</p> <p>No more than 20 people shall attend each course and the Contractor shall allow for sufficient sessions to train all personnel. Subsequent sessions shall be run for any new</p>	<ul style="list-style-type: none"> All staff must be trained in environmental awareness 	<ul style="list-style-type: none"> No pollution of the environment No destruction of the physical environment outside demarcated construction areas No complaints from I&APs 	ECO and Engineer and Contractor	Once off orientation. Quarterly refresher training.

Pre-Construction				
MITIGATION MEASURE	MANAGEMENT OBJECTIVES	MEASURABLE TARGETS	RESPONSIBLE PARTY	FREQUENCY OF ACTION
<p>personnel coming onto site.</p> <p>The environmental awareness training course shall be held in the day during normal working hours. Environmental matters arising should form part of site/office meetings. Any new employees coming on to site after the initial training course and the Contractor's suppliers and subcontractors shall also attend the course. Provision should also be made for quarterly refresher courses to be undertaken during the course of the Contract.</p> <p>The Contractor shall ensure that all attendees sign an attendance register, and shall provide the Engineer with a copy of the attendance register the day after each course.</p>				
<p>4.1.5. Emergencies, non-compliance and communication</p> <p>The contractor must provide method statements on the protocols to be followed, and contingencies to be put in place for potential incidents before construction may begin.</p>	<p>Contingencies for minimising negative impacts associated with emergencies and non-compliance anticipated to occur during the construction phase</p>	<p>Method statements</p>	<p>Contractor, Engineer</p>	<p>Before commencement of construction</p>

Pre-Construction				
MITIGATION MEASURE	MANAGEMENT OBJECTIVES	MEASURABLE TARGETS	RESPONSIBLE PARTY	FREQUENCY OF ACTION
<p>4.1.6. Site clearance and division</p> <p>The Contractor shall ensure that the clearance of vegetation is restricted to that required to facilitate the execution of the Works. Site clearance shall occur in a planned manner, and cleared areas shall be stabilised as soon as possible.</p>	<p>Contingencies for minimizing negative impacts associated with potential site clearance anticipated to occur during the construction phase</p>	<p>Site clearance footprint kept to a minimum</p>	<p>Engineer, contractor</p>	<p>As and when required</p>
<p>4.1.7. Disposal and recycling of Waste:</p> <p>Disposal of construction waste and solid waste produced during the operational phase should be lawfully disposed of. This implies that disposal may only take place at a registered/permitted disposal site.</p> <p>The re-use of material from the demolition of the old boiler must be investigated, for example old concrete and bricks can be used as fill material on site. Metal must be disposed of for recycling purposes.</p>	<ul style="list-style-type: none"> • Life of project planning to ensure the success of the proposed project from 'cradle' to 'grave' • Minimise environmental impact due to inappropriate waste disposal • Following the waste hierarchy of reduce, re-use and recycle. 	<p>Required disposal agreement with local municipality</p>	<p>Project Manager</p>	<p>Prior to Operational Phase</p>

Pre-Construction				
MITIGATION MEASURE	MANAGEMENT OBJECTIVES	MEASURABLE TARGETS	RESPONSIBLE PARTY	FREQUENCY OF ACTION
<p>4.1.8. Storm water management plan for construction and operational phase</p> <p>A storm water management plan should be drawn up for all activities during the construction and operational phase. Design measures to be considered are:</p> <ul style="list-style-type: none"> • Silt traps, • Rehabilitation of un-vegetated areas. Specific consideration should be given to areas sensitive to erosion, near water supply points, edges of slopes, etc. to ensure that there is reduced sediment load onto neighbouring properties as well as any water resources, • Compaction of soils should be limited as far as possible as it would reduce infiltration and result in increased runoff and erosion • Entrainment of particles and debris from ash and biomass storage areas • Entrainment of pollution from leaking waste and chemical containment areas • Entrainment of cement and sand from concrete batching areas. 	<ul style="list-style-type: none"> • Limit volume and velocity of surface water run-off • Limit soil erosion • Limit sedimentation of receiving water bodies 	<p>Storm water management plan for construction and operational phases</p>	<p>Contractor, PM, ECO, Consulting Engineer</p>	<p>Once off prior to construction</p>

Pre-Construction				
MITIGATION MEASURE	MANAGEMENT OBJECTIVES	MEASURABLE TARGETS	RESPONSIBLE PARTY	FREQUENCY OF ACTION
<p>4.1.9. General legislative compliance</p> <p>The Developer must ensure that the need for all relevant environmental authorisations related to the proposed development has been identified. The required applications must be lodged with the relevant authorities. This includes (but is not limited to) the following legislation:</p> <ul style="list-style-type: none"> • National Environmental Management Act 107 of 1998 (NEMA) as amended • National Water Act 36 of 1998 (NWA) • National Environmental Management: Air Quality Act 39 of 2004 (NEMAQA) • National Environmental Management: Waste Act 59 of 2008 (NEMWA) • National Environmental Management: Biodiversity Act 10 of 2004 (NEMBA) • National Heritage Resources Act 25 of 1999 (NHRA). 	Legislative compliance	No legal contraventions	Developer and Project Manager	As required and when new actions are contemplated

Table 2: Construction Phase Mitigation Measures

4.2. Construction				
MITIGATION MEASURE	MANAGEMENT OBJECTIVES	MEASURABLE TARGETS	RESPONSIBLE PARTY	FREQUENCY OF ACTION
<p>4.2.1. Oil and chemicals</p> <p>The contractor must provide method statements for the “handling & storage of oils and chemicals”, “fire”, and “emergency spill procedures”. These substances must be confined to specific, secured areas within the contractor’s camp, and in a way that does not pose a danger of pollution even during times of high rainfall. They should be located outside the 1:100 year flood line of any watercourse and must be fenced to prevent unauthorised access The oil and chemical storage areas must be imperviously bunded with adequate containment (at least 110% of the volume of the fuel) for potential spills.</p> <p>Drip trays must be placed under all construction vehicles that stand for more than 24 hours. Vehicles suspected of leaking must not be left unattended and drip trays must be utilised. Such vehicles must be repaired to prevent further leakages. The surface area of the drip trays must be large enough to catch any substances that may leak from the vehicle while standing. The depth of the drip tray must be determined considering the total amount / volume of oil in the vehicle and it must be able to contain the volume of oil in the vehicle.</p> <p>Spill kits must be available on site and in all vehicles that</p>	<ul style="list-style-type: none"> • Prevention of pollution of the environment • Minimise chances of transgression of the acts controlling pollution 	<ul style="list-style-type: none"> • No pollution of the environment • No litigation due to transgression of pollution control acts • No complaints from I&APs • Method statements 	<p>Contractor</p>	<p>As and when required</p>

4.2. Construction

MITIGATION MEASURE	MANAGEMENT OBJECTIVES	MEASURABLE TARGETS	RESPONSIBLE PARTY	FREQUENCY OF ACTION
<p>transport toxic substances for dispensing. Spill kits must be made up of material/product that is environmentally suitable (Sunsorb™ is a recommended product that is environmentally friendly).</p> <p>All spilled hazardous substances must be contained in impermeable containers for removal to a licensed hazardous waste site, (this includes contaminated soils, and drenched spill kit material).</p> <p>The following should form part of practical spill management:</p> <ul style="list-style-type: none"> • Stop the source of the spill • Contain the spill • All significant spills must be reported to this Department and other relevant authorities • Remove the spilled product for treatment or authorized disposal • Determined if there is any soil, groundwater or other environmental impact. • If necessary, remedial action must be taken in consultation with the Department of Water Affairs. • The incident must be documented. 				

Construction				
MITIGATION MEASURE	MANAGEMENT OBJECTIVES	MEASURABLE TARGETS	RESPONSIBLE PARTY	FREQUENCY OF ACTION
<p>4.2.2. Cement</p> <p>The contractors must provide and maintain a method statement for “cement and concrete batching”. The method statement must provide information on proposed storage, washing & disposal of cement, packaging, tools and plant storage.</p> <p>The mixing of concrete shall only be done at specifically selected sites on mortar boards or similar structures to contain run-off into nearby areas. Cement batching areas must be located in consultation with the RE to ensure residues are contained and that the proposed location does not fall within areas such as storm water channels or areas where it can cause damage or a nuisance (e.g. through dust to road users and neighbours.)</p> <p>Cleaning of cement mixing and handling equipment shall be done using proper cleaning trays.</p> <p>All empty containers must be stored in a dedicated area and later removed from the site for appropriate disposal at a licensed commercial facility.</p> <p>Any spillage that may occur must be investigated and immediate remedial action shall be taken.</p>	<ul style="list-style-type: none"> • Minimise the possibility of cement residue entering into the surrounding environment • Minimise pollution of soil, surface and ground water resources 	<ul style="list-style-type: none"> • No evidence of contaminated soil on the construction site • No evidence of contaminated water resources • Method statement 	Contractor	Monitored daily

Construction				
MITIGATION MEASURE	MANAGEMENT OBJECTIVES	MEASURABLE TARGETS	RESPONSIBLE PARTY	FREQUENCY OF ACTION
<p>4.2.3. Dangerous and Toxic Materials</p> <p>4.2.3.1. Provision of storage facilities</p> <p>Materials such as fuel, oil, paint, herbicide and insecticides must be sealed and stored in secure, bermed areas, as appropriate, in well-ventilated surroundings.</p> <p>Sufficient care must be taken when handling these materials to prevent spillage. Training on the handling of dangerous and toxic materials must be conducted for all staff prior to the commencement of construction.</p> <p>In the case of pollution of any surface or groundwater, the Regional Representative of the Department of Water Affairs (DWA) must be informed immediately.</p> <p>Storage areas shall display the required safety signs depicting “No Smoking”, “No Naked lights” and “Danger” and containers shall be clearly marked to indicate contents as well as safety requirements.</p> <p>The contractor shall supply a method statement for the storage of hazardous materials during the pre-construction phase.</p> <p>Material Safety Data Sheets (MSDS) must be available on site for all hazardous substances on site as supplied by the supplier where relevant. MSDSs must be updated as required.</p>	<ul style="list-style-type: none"> • Prevention of pollution of soil, surface and ground water resources in the immediate and surrounding environments • Minimise chances of transgression of the acts controlling pollution 	<ul style="list-style-type: none"> • No visible signs of pollution • No litigation due to transgression of pollution control acts 	Contractor	Monitor daily

Construction				
MITIGATION MEASURE	MANAGEMENT OBJECTIVES	MEASURABLE TARGETS	RESPONSIBLE PARTY	FREQUENCY OF ACTION
<p>4.2.3.2. Bulk storage of fuels and oils</p> <p>The bulk storage of fuel by contractors may be necessary. If the need arises, the contractors must provide and maintain a method statement for “Diesel tanks and refuelling procedures”.</p> <p>Bulk fuel storage tanks on the site shall be installed on an impervious surface that is bunded and able to contain at least 110% of the volume of the tanks. The filler tap must be inside the bunded area where possible and the bund wall must not have a tap or valve.</p> <p>A Flammable Liquid License must be obtained for diesel volumes greater than 200 litres. Environmental Authorisation is required for volumes of hazardous substances greater than 30 000 litres kept on site (cumulatively calculated with relevance to all types of hazardous substances).</p>	<ul style="list-style-type: none"> • Prevention of pollution of soil, surface and ground water resources in the immediate and surrounding environments • Minimise chances of transgression of the acts controlling pollution 	<ul style="list-style-type: none"> • No visible signs of pollution • No litigation due to transgression of pollution control acts • Method statement 	Contractor	Once off, as required

Construction				
MITIGATION MEASURE	MANAGEMENT OBJECTIVES	MEASURABLE TARGETS	RESPONSIBLE PARTY	FREQUENCY OF ACTION
<p>4.2.3.3. Use of dangerous and toxic materials</p> <p>The contractor shall keep the necessary materials and equipment to deal with spills/ fire in the vicinity of the site and in an easily accessible place, should they occur.</p> <p>The contractor shall set up a procedure for dealing with spills/ fire, which will include notifying the ECO and/or RE and the relevant authorities prior to commencing with construction. These procedures must be developed with consultation and approval by the appointed EO, ECO or RE as applicable.</p> <p>A record must be kept of all spills and the corrective action taken.</p>	<ul style="list-style-type: none"> Prevention of pollution of soil, surface and ground water resources in the immediate and surrounding environments 	<ul style="list-style-type: none"> No pollution of the environment No litigation due to transgression of pollution control acts 	Contractor	As required
<p>4.2.4. Access to site</p> <p>The Contractor shall ensure that access to the Site and associated infrastructure and equipment is off-limits to the public at all times during construction.</p>	<ul style="list-style-type: none"> Control access to site 	<ul style="list-style-type: none"> No unauthorized access to construction sites 	Contractor	Monitor daily

Construction				
MITIGATION MEASURE	MANAGEMENT OBJECTIVES	MEASURABLE TARGETS	RESPONSIBLE PARTY	FREQUENCY OF ACTION
<p>4.2.5. Eating areas and camp followers</p> <p>The contractors must provide and maintain a method statement for “Crew camps and construction lay-down areas”.</p> <p>The Contractor shall, in conjunction with the EO, ECO or RE designate restricted eating areas for eating during normal working hours. This includes kitchen and wash-up facilities. Adequate closed refuse bins must be provided within the contractor’s yard and cleaned on a daily basis.</p> <p>Should it be required that workers reside at the camp, all applicable facilities should be included in the site plan for approval by the ECO.</p> <p>No fires are to be lit outside of a facility designed to contain fires. The adequacy and positioning of these structures must be determined in consultation with the EO, ECO or EO.</p> <p>The feeding, or leaving of food, for stray or other animals in the area is strictly prohibited.</p>	<ul style="list-style-type: none"> • Control potential influx of vermin and flies • Neat work place and hygienic environment • Minimise negative social impacts to local residents and businesses 	<ul style="list-style-type: none"> • No visual sign of vermin and flies • No complaints from I & AP’s 	Contractor, EO	<p>Once off, monitor daily</p> <p>Ongoing</p>

Construction				
MITIGATION MEASURE	MANAGEMENT OBJECTIVES	MEASURABLE TARGETS	RESPONSIBLE PARTY	FREQUENCY OF ACTION
<p>Camp followers/informal traders must not be allowed to congregate on or outside the construction site. However, at the contractors discretion facilities can be made available within the designated eating area.</p> <p>Litter (even if originating outside the camp) must be picked up daily and put into suitably closed bins.</p> <p>4.2.6. Protection of natural features</p> <p>The Contractor shall not permit his employees to make use of any natural water sources in the vicinity (e.g. springs, streams, and open water bodies) for the purposes of swimming, personal washing and the washing of machinery or clothes.</p>				
<p>4.2.7. Community relations</p> <p>The Contractor shall keep a "Complaints Register" on Site. The Register shall contain all contact details of the person who made the complaint, and information regarding the complaint itself.</p>	Consider comments/ complaints	Complaints register	Engineer and Contractor	As and when required
<p>4.2.8. Toilets and ablution facilities</p> <p>In the event that the existing worker toilet facilities on site are inadequate, the following applies:</p> <p>The contractor will be responsible for providing all sanitary</p>	<ul style="list-style-type: none"> • Ensure proper sanitation is achieved which will encourage the workforce to utilize toilets provided 	<ul style="list-style-type: none"> • Workforce use toilets provided • No complaints received from I&APs as well as 	Contractor, RE or EO	As and when required

Construction				
MITIGATION MEASURE	MANAGEMENT OBJECTIVES	MEASURABLE TARGETS	RESPONSIBLE PARTY	FREQUENCY OF ACTION
<p>arrangements for his and the sub-contractors team. A minimum of one chemical toilet shall be provided per 15 persons, and should be placed off the building site.</p> <p>Sanitary arrangements shall be to the satisfaction of the ECO, EO or RE and the local authority. Toilets shall be of the chemical type. The contractor shall keep the toilets in a clean, neat and hygienic condition. The contractor shall supply toilet paper in all toilets at all times. Toilet paper dispensers shall be provided in all toilets.</p> <p>Toilets provided by the contractor must be easily accessible and placed a maximum of 50m from the work area to ensure they are utilised. Toilets should preferably not be located in or near storm water channels. The contractor (who must use reputable toilet-servicing company) shall be responsible for the cleaning, maintenance and servicing of the toilets. The contractor (using reputable toilet-servicing company) shall ensure that all toilets are cleaned and emptied before public holidays.</p> <p>Toilets must be secured to the ground to prevent them from falling over and have a sufficient locking mechanism that is operational at all times.</p>	<p>and not the surrounding habitat</p> <ul style="list-style-type: none"> • Minimise potential of diseases on site • Minimise potential to pollute soils, water resources and natural habitats 	<p>members of the workforce</p> <ul style="list-style-type: none"> • No visible or measurable signs of pollution of the environment (soils, ground and surface water) 		
<p>4.2.9. Fire Control</p> <p>The contractors must provide and maintain a method statement for "Fires", clearly indicating where and for what fires will be utilised plus details on the fuel to be utilised.</p>	<ul style="list-style-type: none"> • Minimise risk of forest fires • Minimise destruction of natural fauna and flora 	<ul style="list-style-type: none"> • No veldt or forest fires started by the contractor's workforce • No claims from 	Contractor, EO, ESO	Monitor daily

Construction				
MITIGATION MEASURE	MANAGEMENT OBJECTIVES	MEASURABLE TARGETS	RESPONSIBLE PARTY	FREQUENCY OF ACTION
<p>Contact must be established with the forest fire management organisation in the area to discuss and align the method statement to current fire prevention and fire fighting arrangements.</p> <p>Fire prevention precautions and Standard Operating Procedures (SOPs) should be implemented if welding or hot cutting is undertaken outside established welding work stations, including 'Hot Work Permits, stand-by fire extinguishers, stand-by fire watch, and maintaining the fire watch for up to one hour after welding or hot cutting has terminated.</p>	<ul style="list-style-type: none"> • Maintain safety on site 	<p>landowners for damages due to veldt and forest fires</p> <ul style="list-style-type: none"> • Method statement 		
<p>4.2.10. Protection of Fauna</p> <p>All activities on site must comply with the regulations of the Animal Protection Act, 1962 (Act No. 71 of 1962).</p> <p>All construction workers must be informed that the intentional killing of any animal is not permitted. Poaching is illegal and it must be a condition of employment that any employee caught poaching will be dismissed. Employees must be trained on how to deal with fauna species found on site as intentional killing will not be tolerated. In the case of a problem animal e.g. a large snake a specialist must be called in to safely relocate the animal if the EO or ECO is not able to.</p> <p>Environmental induction training must include safety with wild animals incorporated into the talk. All workers on site</p>	<ul style="list-style-type: none"> • Minimise disturbance to animals • Minimise interruption of breeding patterns of birds • Minimise destruction of habitat 	<ul style="list-style-type: none"> • No complaints from Nature Conservation • No litigation concerning applicable animal protection acts • No measurable or visible signs of habitat destruction 	RE, Contractor, EO, ESO	Monitor daily

Construction				
MITIGATION MEASURE	MANAGEMENT OBJECTIVES	MEASURABLE TARGETS	RESPONSIBLE PARTY	FREQUENCY OF ACTION
must receive this training. Focus must be on animals such as snakes and other reptiles that often generate fear by telling workers how to move safely away and to whom to report the sighting. Workers should also be informed where snakes most often hide so that they can be vigilant when lifting stones etc.				
<p>4.2.11. Access route /haul roads</p> <p>Existing roads and services must be utilised as far as possible. Vehicles should be restricted to demarcated areas.</p> <p>Access roads for earthmoving-equipment must be clearly designated and be positioned as close as possible to the proposed construction site. No driving off from the current road infrastructure is permitted and designated parking areas must be identified and demarcated with applicable signage.</p> <p>Dust suppression must be practiced on dirt roads to prevent a dust nuisance.</p>	Minimise soil compaction and damage of areas outside of demarcated roads.	<ul style="list-style-type: none"> No new informal access roads created after completion of construction 	Contractor, RE or EO	As required, monitor daily
<p>4.2.12. Waste Management</p> <p>On-going control of waste management activities as per the method statement must be executed</p>	Minimisation of nuisances, environmental damage and depletion of natural resources	Compliance with the method statement	Contractor, RE or EO	As required, monitor daily

Table 3: Mitigation measures related to the Operation Phase of the project

4.3. Operation

MITIGATION MEASURE	MANAGEMENT OBJECTIVES	MEASURABLE TARGETS	RESPONSIBLE PARTY	FREQUENCY OF ACTION
<p>4.3.1. General Waste management</p> <ul style="list-style-type: none"> • A sufficient number of containers must be strategically placed to handle the amount of litter, waste, rubbish and debris generated by the development. All refuse bins must have a lid secured so that animals and insects cannot gain access. • Under no circumstances may any waste be burnt. • All waste must be disposed of at a registered site or as otherwise agreed upon with the regulatory authorities. It is the management bodies' responsibility to ensure that the contracted party responsible for waste disposal disposes of the waste in a legal manner. • Waste must be segregated to facilitate re-use and recycling. • Instituting good housekeeping and operating practices, including inventory control to reduce the amount of waste resulting from materials that are out-of-date, off-specification, contaminated, damaged, or excess to plant needs. • Instituting procurement measures that recognise opportunities to return usable materials such as containers and which prevents the over ordering of materials. • Minimising hazardous waste generation by implementing stringent waste segregation to prevent the commingling of non-hazardous and hazardous waste to be managed. 	<ul style="list-style-type: none"> • Sustainable management of waste • Minimise litigation and complaints by I&APs • Reduce visual impact • Control potential influx of vermin and flies thereby minimising the potential of diseases at the site and the surrounding environment • Minimise potential to pollute soils, water 	<ul style="list-style-type: none"> • Disposal of refuse in an appropriate manner with no refuse polluting the development • No complaints from I&AP's • Sufficient containers available on or near the site • No visible or measurable signs of pollution of the environment (soils, ground and surface water) 	<ul style="list-style-type: none"> • Site manager or delegated person 	<ul style="list-style-type: none"> • Daily

4.3. Operation

MITIGATION MEASURE	MANAGEMENT OBJECTIVES	MEASURABLE TARGETS	RESPONSIBLE PARTY	FREQUENCY OF ACTION
	resources and natural habitats			
<p>4.3.2. Oil and chemicals</p> <ul style="list-style-type: none"> • These substances must be confined to designated, secured areas in a way that does not pose a danger of pollution even during times of high rainfall. The oil and chemical storage areas must be imperviously banded with adequate containment (at least 110% of the volume of the fuel) for potential spills. • Spill kits must be available on site and in all vehicles that transport toxic substances for dispensing. Spill kits must be made up of material/product that is environmentally suitable (Sunsorb™ is a recommended product that is environmentally friendly). • All spilled hazardous substances must be contained in impermeable containers for removal to a licensed hazardous waste site, (this includes contaminated soils, and drenched spill kit material). • Contaminated/hazardous materials must be disposed of at permitted hazardous landfill site. 	<ul style="list-style-type: none"> • Prevention of pollution of the environment • Minimise chances of transgression of the acts controlling pollution 	<ul style="list-style-type: none"> • No pollution of the environment • No litigation due to transgression of pollution control acts • No complaints from I&APs 	Site manager or delegated person	Daily

4.3. Operation

MITIGATION MEASURE	MANAGEMENT OBJECTIVES	MEASURABLE TARGETS	RESPONSIBLE PARTY	FREQUENCY OF ACTION
<p>4.3.3. Storm Water Management</p> <p>A Storm Water Management Plan should be drawn-up for the operational phase of the project. The Plan must be implemented and the related infrastructure maintained for the life of the operations. Design measures to be considered are:</p> <ul style="list-style-type: none"> • Silt traps • Entrainment of particles and debris from ash and biomass storage areas • Entrainment of pollution from leaking waste and chemical containment areas • Ponding of storm water on site • Large scale concentrated run-off from impervious areas onto neighbouring properties, causing secondary problems at that site, as well as erosion channels. • Cognisance must be taken of the section on Rain Water Harvesting in this EMP, when compiling the storm water management plan. 	<p>Minimisation of environmental and water pollution</p>	<p>Storm water management plan developed and implemented</p>	<p>Site manager or delegated person</p>	<p>As and when required</p>
<p>4.3.4. Noise pollution</p> <p>A noise impact assessment will have to be conducted once the plant is in full operation. Should it be found that excessive levels of noise is being generated, the required engineering controls must be instituted in order to bring noise levels down to acceptable levels.</p> <p>Screening off areas which generate high levels of noise in an environmentally friendly manner may be necessary. It may also be</p>	<ul style="list-style-type: none"> • Minimise disturbance caused by excessive noise 	<ul style="list-style-type: none"> • No complaints from surrounding residents 	<p>Site manager or delegated person</p>	<p>Mitigation measure to be implemented once off.</p> <p>Monitoring and corrective actions to be</p>

4.3. Operation

MITIGATION MEASURE	MANAGEMENT OBJECTIVES	MEASURABLE TARGETS	RESPONSIBLE PARTY	FREQUENCY OF ACTION
necessary to limit certain activities responsible for excessive noise, to between 7pm and 7 am.				done as and when required
<p>4.3.5. Safety and Security</p> <p>An emergency plan (including fire management) must be developed and implemented for maintenance during operations.</p>	<ul style="list-style-type: none"> • Reduce the risk of potential incidences • Minimise litigation and complaints by I&APs 	<ul style="list-style-type: none"> • No complaints from surrounding residents 	Site manager or delegated person	As and when required
<p>4.3.6. Stack emissions from the boiler plant</p> <p>a) Control equipment:</p> <p>The following constituents are expected from stack emissions on site:</p> <ol style="list-style-type: none"> i. Particulate matter (PM₁₀ and PM_{2.5}) ii. NOx iii. SOx iv. CO <p>Adequate air quality control equipment has to be installed to ensure that stack emissions comply with the NEMAQA.</p> <p>Stack emissions from the collection chamber may not cause secondary pollution or nuisances. Collected fly-ash must be stored in containers with lids. During the collection of fly-ash, personnel must be</p>	<ul style="list-style-type: none"> • Prevention of ambient air pollution 	Legal compliance	Site manager or delegated person	Ongoing

4.3. Operation

MITIGATION MEASURE	MANAGEMENT OBJECTIVES	MEASURABLE TARGETS	RESPONSIBLE PARTY	FREQUENCY OF ACTION
<p>equipped with appropriate face masks to prevent inhaling of fine particulate matter. Fly-ash must be disposed of to an appropriate licenced landfill site. . All safe disposal certificates will be retained on site. The quantity of fly-ash stored will not exceed 35m³ (to be calculated cumulatively with other hazard waste on site) at any time.</p> <p>b) Monitoring:</p> <p>Annual isokinetic sampling must be undertaken by a qualified person to ensure that stack emissions comply with the NEMAQA.</p> <p>c) Operation of the boiler:</p> <p>An important factor for emission control and reduction are proper fuel preparation and fuel input. To reduce emissions, the fuel should be fed to the boiler at a constant flow and have a constant (as far as is reasonably possible) calorific value.</p> <p>Operational optimisation is also a critical factor to limit stack emissions. For example the regulation of primary and secondary air flow should be closely monitored. For the purposes of optimal operation of the boiler, a suitably qualified person must be appointed to oversee boiler operations.</p> <p>Shutdown and start-up of the boiler should be minimised as far as reasonably possible.</p> <p>d) Maintenance</p> <p>An Operation and Maintenance manual must be compiled to ensure optimal functioning of the boiler</p>				

4.3. Operation

MITIGATION MEASURE	MANAGEMENT OBJECTIVES	MEASURABLE TARGETS	RESPONSIBLE PARTY	FREQUENCY OF ACTION
<p>e) Stack Height</p> <p>The stack height must be designed accordingly to avoid excessive ground level concentrations due to downwash, wakes, and eddy effects, and to ensure reasonable diffusion to minimise impacts.</p>				
<p>4.3.7. Dust Control</p> <p>a) The drop to the ash hopper and ash stockpile should be minimised (or enclosed) to reduce the generation of fugitive dust.</p> <p>b) Dust control measures must be implemented for the transport and application of ash back to the plantations. Ash will be contained in bags suitable for this purpose.</p> <p>c) Dust suppression measures must be applied to all dirt roads on site</p> <p>d) Measures to prevent fugitive dust emissions from biomass stockpiles as well as conditioning operations related to the biomass must be implemented.</p> <p>e) Dust and mud should be controlled at vehicle exit and entry points to prevent the dispersion of dust and mud beyond the site boundary. Facilities for the washing of vehicles could be provided at the entry and exit points.</p> <p>f) A speed limit of 40 km/h should be set for all vehicles travelling over exposed areas or near stockpiles. Traffic over exposed areas should be kept to a minimum</p> <p>g) All forestry residue stockpiles should be maintained for as short a time as possible and should be enclosed by wind</p>	<ul style="list-style-type: none"> • Prevention of ambient air pollution 	<ul style="list-style-type: none"> • Legal compliance • No complaints by I&AP's 	<p>Site manager or delegated person</p>	<p>Ongoing</p>

4.3. Operation

MITIGATION MEASURE	MANAGEMENT OBJECTIVES	MEASURABLE TARGETS	RESPONSIBLE PARTY	FREQUENCY OF ACTION
<p>breaking enclosures of similar height to the stockpile. Location of material storage should take into account the predominant wind direction. During the transfer of material to piles, drop heights should be minimised to control the dispersion of materials being transferred.</p> <p>4.3.8. Vehicle Emissions</p> <p>Maintenance of trucks to prevent inefficient combustion and high emission rates of exhaust gasses, must be done at the required intervals</p>				
<p>4.3.9. Fire Management</p> <p>A fire prevention and fire management plan must be developed and should include surveying storage areas for biomass and liquid fuels with automatic systems, to detect fires, caused by self-ignition and to identify risk points.</p>	<p>Fire safety on site and prevention of veldt and plantation fires</p>	<p>No fires on site, or fires are contained within the first 3 minutes</p>	<p>Site manager or delegated person</p>	<p>Ongoing</p>
<p>4.3.10. Ash Management</p> <p>a) Wood ash (bottom ash from the furnace) must be analysed for chemical composition before it is applied. The analysis must show that the ash have value as a soil ameliorant and have acceptable low levels of heavy metals.</p> <p>b) Wood ash may be spread in existing plantations or incorporated into the soil when plantations are replanted</p> <p>c) Wood ash must be applied according to generally accepted fertilizer guidelines and care must be taken to prevent over</p>	<ul style="list-style-type: none"> • Prevention of environmental pollution through wind-blown ash • Prevention of water pollution through entrainment of ash in run-off 	<p>Ash management plan compiled and approved off.</p> <p>Full implementation of the plan.</p>	<p>Site manager or delegated person</p>	<p>Once off, as well as on-going monitoring.</p>

4.3. Operation

MITIGATION MEASURE	MANAGEMENT OBJECTIVES	MEASURABLE TARGETS	RESPONSIBLE PARTY	FREQUENCY OF ACTION
<p>application</p> <p>d) The ash should be processed (hardened) before application and the forming of dust during spreading must be minimized</p> <p>e) Sensitive areas such as wetlands and key habitats should be avoided when applying ash</p> <p>f) Ash application can be done any time of the year, but periods of heavy rainfalls and wind must be avoided, given that ash may be flushed or blown away.</p> <p>g) Erosion of soil in plantations due to damage and soil compaction caused by heavy machinery must be avoided. Consequences are reduced resistance to storms because of exposed roots, root rot and decreased growth. This can be avoided by planning appropriate routes, crossings and drop zones ahead of time</p> <p>h) Avoid driving in low parts, where the soil is often wet with low buoyancy</p> <p>i) Use forest residues to reinforce soil with low buoyancy in parts of the plantation frequented by heavy machinery</p> <p>j) Driving of heavy machinery and off-road vehicles along edges of streams, lakes and wetlands must be avoided. It is advised that as far as practically possible, a 30 meter buffer zone around water resources should be respected</p> <p>k) The application of ash in natural and undisturbed areas is not allowed. This includes any wetland and riparian areas. Ash may also not be applied closer than the 1:100 year flood line or 50 meters from any water course, whichever is the greatest</p> <p>l) Wetlands are no-driving zones</p> <p>m) Ash must be applied in such a manner to prevent wash-out by</p>	<ul style="list-style-type: none"> • Prevention of soil deterioration through excessive amounts of ash application • Prevention of disturbance of natural features such as wetlands and riparian areas • Prevention of erosion and compaction by transport and other heavy machinery 			

4.3. Operation

MITIGATION MEASURE	MANAGEMENT OBJECTIVES	MEASURABLE TARGETS	RESPONSIBLE PARTY	FREQUENCY OF ACTION
<p>rains and entrainment in run-off</p> <p>n) The protection of workers during ash application must include measures to prevent skin, eye and respiratory exposure.</p> <p>o) Temporary ash stockpiles:</p> <ul style="list-style-type: none"> i. The transport of ash from the point of origin to the point of use must be done in such a manner that ash dust is not dispersed during transport. This can be accomplished for example by covering the ash with a tarpaulin, or transporting the ash in bags or bins with a lid ii. It is preferable to apply the ash to land directly from the vehicle used for transport to the point of use. If this is not practical, the location where the ash is temporarily stored must be selected by adhering to the criteria mentioned in this section (g,h,j,k,l,m) iii. The temporary stockpile must be protected from wind liberating ash from the stockpile, to prevent a dust nuisance and pollution of surface water bodies. <p>p) Temporary stockpile locations must be varied, to prevent localized over exposure of soil to high ash quantities.</p>				
<p>4.3.11. Collection of Biomass and plantation residues from plantations</p> <p>a) Erosion of soil in plantations due to damage and soil compaction caused by heavy machinery must be avoided. Consequences are reduced resistance to storms because of</p>	<ul style="list-style-type: none"> • Prevention of disturbance of natural features such as wetlands and riparian 	<ul style="list-style-type: none"> • No disturbance of natural features such as wetlands and riparian areas • No erosion and 	<p>Site manager or delegated person</p>	<p>Once off, as well as on-going monitoring.</p>

4.3. Operation

MITIGATION MEASURE	MANAGEMENT OBJECTIVES	MEASURABLE TARGETS	RESPONSIBLE PARTY	FREQUENCY OF ACTION
<p>exposed roots, root rot and decreased growth. This can be avoided by planning appropriate routes, crossings and drop zones ahead of time.</p> <p>b) Avoid driving in low parts, where the soil is often wet with low buoyancy.</p> <p>c) Driving of heavy machinery and off-road vehicles along edges of streams, lakes and wetlands must be avoided. It is advised that as far as practically possible, a 30 meter buffer zone around water resources should be respected</p> <p>d) Wetlands are no-driving zones</p>	<p>areas</p> <ul style="list-style-type: none"> • Prevention of erosion and compaction by transport and other heavy machinery 	<p>compaction by transport and other heavy machinery</p>		
<p>4.3.12. Conserving water resources</p> <p>Water must be conserved through the following measures:</p> <p>a) Use of a closed circuit dry cooling system for the boiler unit</p> <p>b) Use of potable water with high pressure hoses to wash motor vehicles and clean paved areas is prohibited</p> <p>c) Quenching of ash must be done with effluent from the demineralisation plant</p> <p>d) Identification of and repair of steam and condensate leaks, and repair of all failed steam traps must be undertaken as soon as possible</p> <p>e) Return of condensate to the boiler house, and use of heat exchangers (with condensate return) rather than direct steam injection where process permits</p> <p>f) Flash steam recovery</p> <p>g) Minimising boiler blow down consistent with maintaining acceptably low dissolved solids in boiler water.</p>	<p>Water Conservation</p>	<ul style="list-style-type: none"> • Water wastage are not occurring • Rain water harvesting implemented 	<p>Site manager or delegated person</p>	<p>Once off, as well as on-going monitoring.</p>

4.3. Operation

MITIGATION MEASURE	MANAGEMENT OBJECTIVES	MEASURABLE TARGETS	RESPONSIBLE PARTY	FREQUENCY OF ACTION
<p>h) Minimising de-aerator heating</p> <p>i) Implementation of rain water harvesting from roofs and impervious areas (where practical) must be investigated and implemented. Water thus harvested may not be used as potable water, but is suitable for dust suppression, ablution and feed water for the boiler. Personnel on site must be made aware that this water is not for drinking purposes. Signs to this effect must be indicated on holding tanks.</p> <p>Any water leak will be repaired as soon as possible, but within 8 hours.</p>				
<p>4.3.13. Water Conservation Awareness</p> <p>The Site Management of the Busby Renewables Project will provide a water conservation awareness program to all employees on site. This must include the use of rain water harvesting and its appropriate uses.</p>	<p>All staff must be trained in water conservation</p>	<p>Training/awareness sessions conducted quarterly</p> <p>Water use of the plant remains within its allocated use</p>	<p>Site manager or delegated person</p>	<p>The need to conserve water will be discussed monthly at staff meetings.</p> <p>Water and environmental awareness training to be conducted quarterly for all staff</p>

4.3. Operation

MITIGATION MEASURE	MANAGEMENT OBJECTIVES	MEASURABLE TARGETS	RESPONSIBLE PARTY	FREQUENCY OF ACTION
<p>4.3.14. Measurement of water use</p> <p>Flow meters will be installed. Readings will be recorded weekly and summarised monthly. A water-use log will be provided to the relevant DWA regional office on a monthly basis.</p>	<ul style="list-style-type: none"> To ensure that water use remains within the allocated volumes. Legislative compliance 	<p>Water use of the plant remains within its allocated use</p>	<p>Site manager or delegated person</p>	<p>Weekly</p>
<p>4.3.15. Calibration of Flow meters</p> <p>Flow meters will be calibrated annually by a suitably qualified person.</p>	<ul style="list-style-type: none"> To ensure that water use remains within the allocated volumes. Legislative compliance 	<p>Water use of the plant remains within its allocated use</p>	<p>Site manager or delegated person</p>	<p>Annually</p>
<p>4.3.16. Protection of Boreholes</p> <p>Boreholes will be suitably enclosed to ensure safety and prevent pollution ingress. Regular inspections will be carried out to determine the levels of compliance</p>	<p>To promote safety and prevent pollution</p>	<p>No safety incident and no pollution ingress</p>	<p>Site manager or delegated person</p>	<p>Weekly</p>
<p>4.3.17. Prevention of water pollution</p> <ul style="list-style-type: none"> Discharges of process wastewater, sanitary wastewater, and wastewater from utility operations or storm water to surface water will not be allowed, unless authorisation has been 	<p>Prevention of water resource pollution</p>	<p>No pollution incident and no ongoing pollution of water resources</p>	<p>Site manager or delegated person</p>	<p>Ongoing</p>

4.3. Operation

MITIGATION MEASURE	MANAGEMENT OBJECTIVES	MEASURABLE TARGETS	RESPONSIBLE PARTY	FREQUENCY OF ACTION
<p>obtained to do so. Discharges should not result in contaminant concentrations in excess of local ambient water quality criteria or, in the absence of local criteria, other sources of ambient water quality, or as defined by conditions attached to an authorization.</p> <ul style="list-style-type: none"> Land application of waste water may not be undertaken, unless permission from the competent authority has been obtained. 				
<p>4.3.18. Secondary Containment</p> <p>Secondary containment (bundling) must be maintained around all hazardous liquids. The bunding must be able to contain 110% of the volumes stored.</p>	Pollution prevention	No safety incident and no environmental pollution	Site manager or delegated person	Ongoing
<p>4.3.19. Traffic safety</p> <p>It is envisaged that traffic volumes will increase on the roads in the immediate vicinity of the plant. The following measures must be implemented:</p> <ul style="list-style-type: none"> Driver road safety awareness – including other motorised road users, pedestrians and animals Signage should indicate slow moving vehicles such as tractors on roads frequented by such vehicles Regular vehicle maintenance 	Safety of people and animals on the road	No safety incident and no killing of roaming animals	Site manager or delegated person	Ongoing

4.3. Operation

MITIGATION MEASURE	MANAGEMENT OBJECTIVES	MEASURABLE TARGETS	RESPONSIBLE PARTY	FREQUENCY OF ACTION
<p>4.3.20. Re-fuelling of vehicles</p> <p>Should refuelling of vehicles takes place on site, the following measures must be implemented:</p> <ul style="list-style-type: none"> • Re-fuelling must take place in a designated area on an impervious concrete surface • The re-fuelling area must allow for spill containment • Spill kits must be kept in the re-fuelling area 	Pollution prevention	No safety incident and no environmental pollution	Site manager or delegated person	Ongoing
<p>4.3.21. Sanitation facilities</p> <p>The site is currently making use of a French drain system. With an increase in personnel on site, the ability of the system to cope with the additional load must be monitored. Should it be found that the system is inadequate, the capacity of the system must be enlarged to handle human waste effectively without causing a nuisance.</p>	Pollution prevention	No overflows from the sanitary system on site	Site manager or delegated person	Ongoing
<p>4.3.22. Alien Invasive Vegetation</p> <p>The establishment of alien invasive vegetation on site must be monitored and managed.</p>	Dispersion of alien vegetation into the surrounding areas	No alien invasive vegetation on site	Site manager or delegated person	Ongoing
<p>4.3.23. Borehole drawdown:</p> <p>Any complaints by neighbouring properties regarding unacceptable</p>	To mitigate any unforeseen ground water	Minutes of meetings relating to any complaints by	Site manager or delegated person	When applicable

4.3. Operation

MITIGATION MEASURE	MANAGEMENT OBJECTIVES	MEASURABLE TARGETS	RESPONSIBLE PARTY	FREQUENCY OF ACTION
<p>levels of drawdown, will be investigated, through the appointment of an independent geo-hydrologist. It must be included in the scope of such a study, that a comprehensive report plus recommendations be submitted to the relevant DWA regional office.</p>	<p>impacts</p>	<p>neighbouring properties.</p>		
<p>4.3.24. Cleaning solution of membrane filter media</p> <p>Cleaning solution will be contained in spill-proof, impermeable containers stored in a concrete bunded area. The bunded area will be able to hold 110% of the volumes stored and will be protected from rain water ingress by a roof structure. The containment area will be an integral part of the water conditioning plant to prevent the conveyance of the solution over a longer distance.</p> <p>The cleaning solution will be decanted from the conditioning water treatment plant via a direct pipe connection to the storage containers. The decanting and storage infrastructure will all be housed on a bunded concrete floor under a roof structure to prevent rainwater ingress.</p> <p>The cleaning solution will be removed by a company registered to transport hazardous material. Removal for disposal will take place to a registered hazardous waste site. All safe disposal certificates will be retained on site. The quantity of solution stored will not exceed 35m³ (to be calculated cumulatively with other hazard waste on site) at any time.</p>	<p>To ensure that cleaning solution does not pollute the environment</p>	<p>Safe disposal certificates.</p> <p>Construction and maintenance of the required infrastructure as specified.</p>	<p>Site manager or delegated person</p>	<p>On-going</p>
<p>4.3.25. Abstraction</p> <p>Abstraction for the purposes of the boiler operation will not exceed</p>	<p>To ensure that drawdown levels remains within</p>	<p>Drawdown levels remain above 5 meters</p>	<p>Site manager or delegated person</p>	<p>Daily</p>

4.3. Operation

MITIGATION MEASURE		MANAGEMENT OBJECTIVES	MEASURABLE TARGETS	RESPONSIBLE PARTY	FREQUENCY OF ACTION
120m ³ per day and will take place in accordance with the schedule below:		acceptable levels			
Borehole	Total maximum daily pumping hours	Rate (l/s)	Volume (m3/d)		
Busby BH2	9	0.6	20		
Busby BH3	10	3.1	100		
Total			120		

Table 5: Decommissioning Phase Mitigation Measures

4.4. Decommissioning				
MITIGATION MEASURE	MANAGEMENT OBJECTIVES	MEASURABLE TARGETS	RESPONSIBLE PARTY	FREQUENCY OF ACTION
<p>Should it become evident that operations are to be discontinued, a decommissioning plan must be complied in order to ensure:</p> <ul style="list-style-type: none"> • The safety of the structures that is left behind • That all hazardous materials are removed from site • That all combustible materials are removed from site • That all ash is removed from site • That all waste is safely disposed • That boreholes are securely closed to prevent accidents • That storm water containment structures are dismantled to allow for the free flowing of water on par with pre-construction conditions • That all residual polluted areas are adequately rehabilitated • That all disturbed areas are re-vegetated with a suitable specie. 	<p>Safety and Pollution prevention</p>	<p>No safety incident and no environmental pollution</p>	<p>Site manager or delegated person</p>	<p>On closure</p>

Table 6: Environmental Incident Log

DATE	ENVIRONMENTAL CONDITION	COMMENTS (Include any possible explanations for current condition and possible responsible parties. Include photographs, records etc. if available)	CORRECTION ACTION TAKEN	SIGNATURE

Annexure 1

METHOD STATEMENT

CONTRACT:..... **DATE:**.....

WHAT WORK IS TO BE UNDERTAKEN (give a brief description of the works):

WHERE ARE THE WORKS TO BE UNDERTAKEN (where possible, provide an annotated plan and a full description of the extent of the works):

START AND END DATE OF THE WORKS FOR WHICH THE METHOD STATEMENT IS REQUIRED:

Start Date:..... **End Date:**.....

HOW ARE THE WORKS TO BE UNDERTAKEN (provide as much detail as possible, including annotated sketches and plans where possible): * Note: please attach extra pages if more space is required

DECLARATIONS for Method Statement

1) ENGINEER

The work described in this Method Statement, if carried out according to the methodology described, is satisfactory to prevent or control environmental harm and is thus approved:

(Signed)

(Print name)

Dated: _____

2) CONTRACTOR

I understand the contents of this Method Statement and the scope of the works required of me. I further understand that this Method Statement may be amended on application to and with approval by the Engineer, and that the SHE Coordinator, Construction Manager and ECO will audit my compliance with the contents of this Method Statement

(Signed)

(Print name)

Dated: _____



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APPENDIX 5:

Site Plan



Please find in this section:

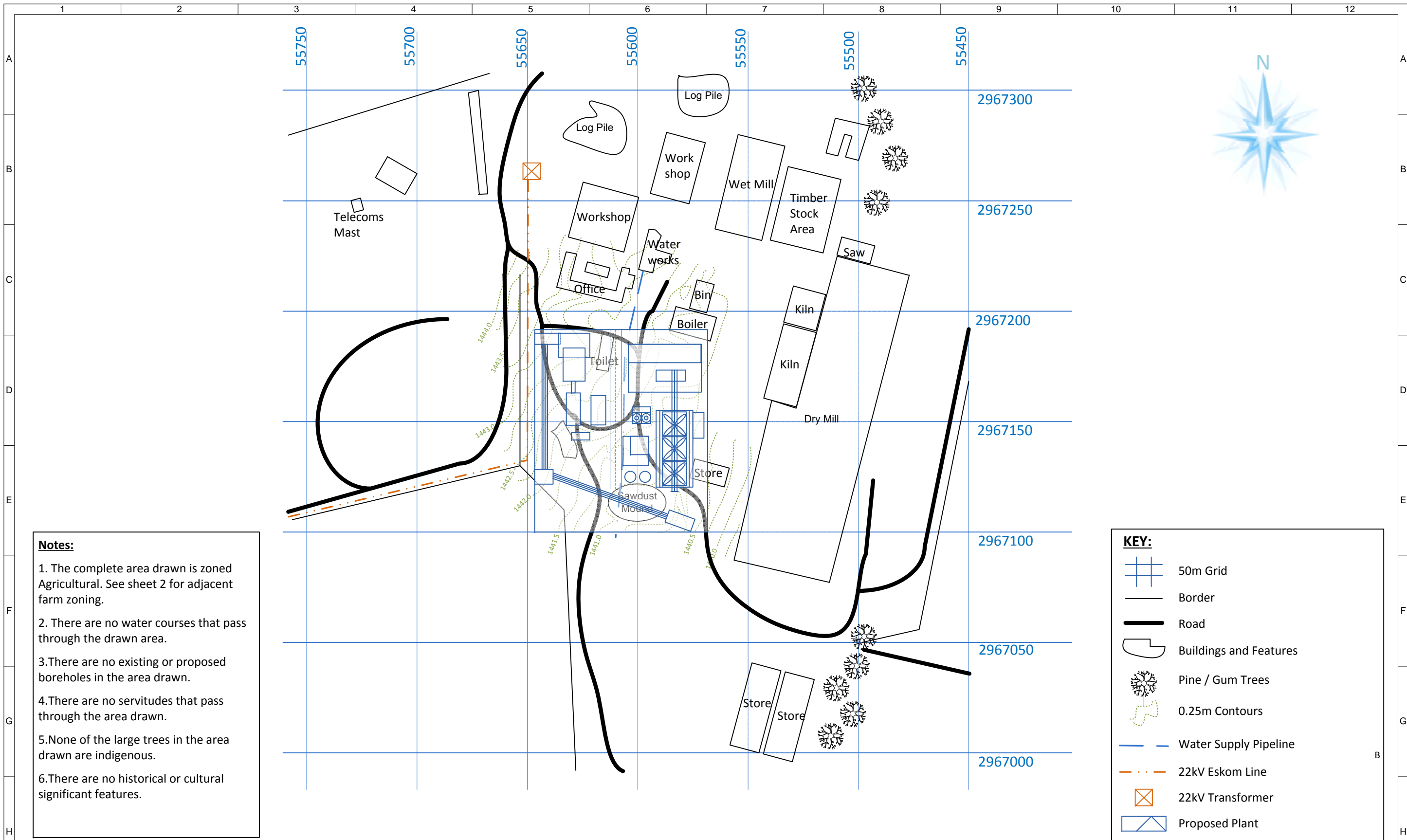
1. Proposed Site Layout: Sheet 1,
shows existing infrastructure and natural environment with proposed layout .

2. Proposed Site Layout: Sheet 2 ,
shows zoning of farm and adjacent farms .

3. Letter from Plan 2 Survey,
confirming that the Farm Valschvlei No 352-IT is not located within a town planning scheme
area and no zoning certificate can be supplied.

4. Letter from Mpumalanga Provincial Government, Department : Agricultural, Rural
Development and Land Administration,
listing the land zoning.

5. Letter from VFV Attorneys
regarding the interpretation of the zoning.

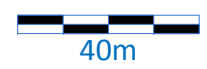


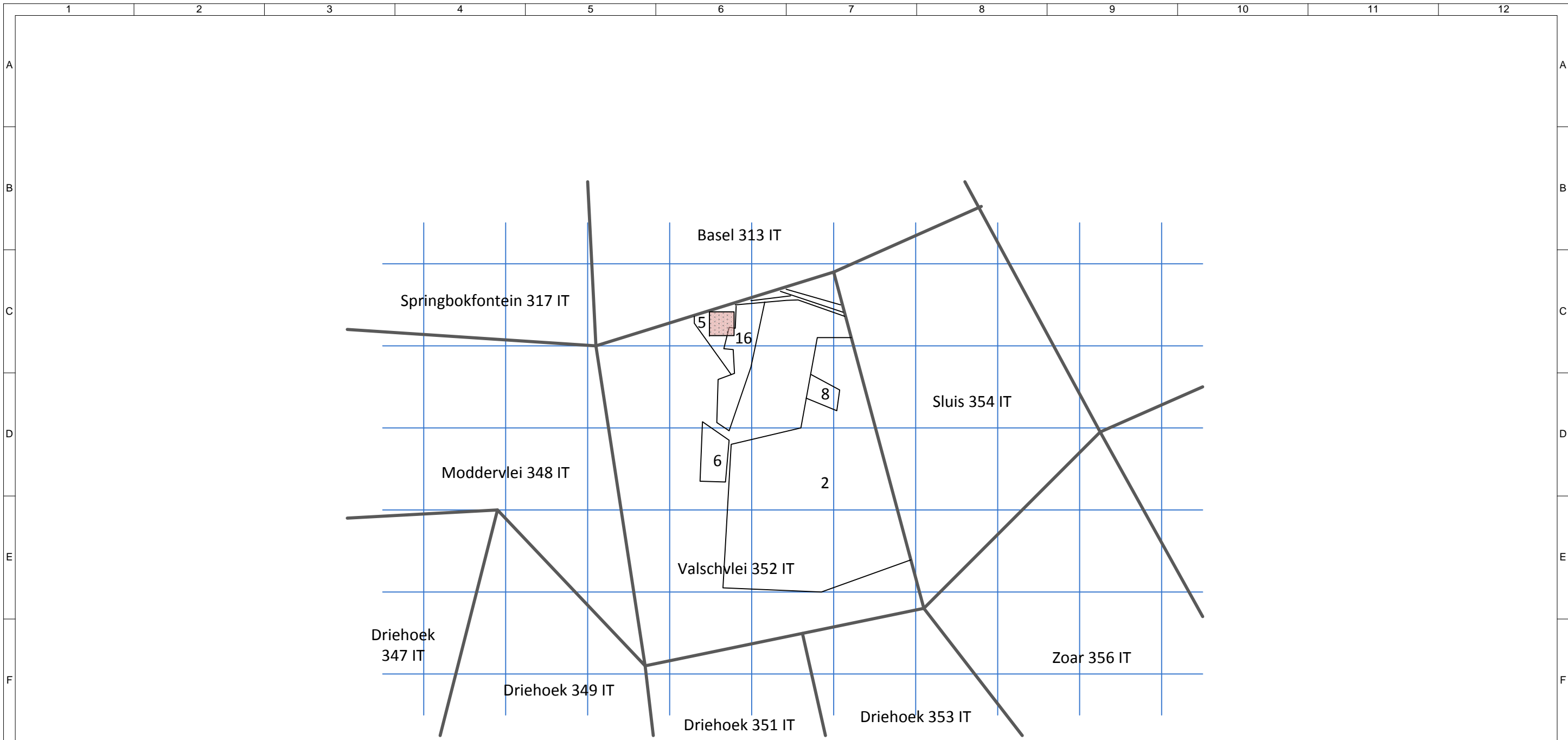
- Notes:**
1. The complete area drawn is zoned Agricultural. See sheet 2 for adjacent farm zoning.
 2. There are no water courses that pass through the drawn area.
 3. There are no existing or proposed boreholes in the area drawn.
 4. There are no servitudes that pass through the area drawn.
 5. None of the large trees in the area drawn are indigenous.
 6. There are no historical or cultural significant features.

KEY:

- 50m Grid
- Border
- Road
- Buildings and Features
- Pine / Gum Trees
- 0.25m Contours
- Water Supply Pipeline
- 22kV Eskom Line
- 22kV Transformer
- Proposed Plant

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	Drawing / Document No:	Drawing / Document Title:	Description	REV	ECP No	Drawn	Date	Check	Date	Appr	Date	N/A				Busby Renewables Energy Plant		
			Issued for draft BAR	1		RJJ	17/7	RP	17/7				A3	DRAWN	RJJ	17/7/2013	Valschvlei (IT 352), Portion 5, Mpumalanga	
														CHECKED	RP	17/7/2013	SUBTITLE:	
														APPROVED			Proposed Site Layout	
																DRG NO:	SCALE	REV:
																ZA12EN62NT01-DW-001	3:5000	A
																	SHT	OF
																	1	2





Zoning Information for erf 352 IT:

1. The original farm area is zoned Agricultural.
2. Portion 5 is zoned Agricultural.
3. Portion 16 is zoned Agricultural and Industrial.
4. Portion 2 is zoned Agricultural.
5. Portion 6 is zoned Agricultural.
6. Portion 8 is zoned Agricultural.

KEY:

- 1000m Grid
- Original Farm Boundary
- Erf Portion Boundary
- N** Erf Portion Number
- Proposed Site Area

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			Issued for draft BAR	1		RJJ	18/7	RP	18/7				A3				Valschlei (IT 352), Portion 5, Mpumalanga	
																	SUBTITLE: Proposed Site Layout	
																DRG NO: ZA12EN62NT01-DW-001		
																SCALE 1:50000	REV: A	
																SHT 2 OF 2		



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Facsimile: (013) 741 3752 Nelspruit
1200
E-mail: plan2survey@telkomsa.net



Our Ref: K2484/KNK
Your Ref:

28 February 2011

The Directors
Busby Saw Mills (Pty) Ltd
PO Box 490
AMSTERDAM
2375

Attention: Mr Johann Ernst
Telephone: (017) 820 0332/3
Telefax: (017) 820 0334
Cellular: 083 265 0887
Cellular: 084 761 9579 (Carika: Secretary)
E-mail: jernst@lantic.net

Dear Sir

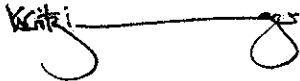
THE REMAINING EXTENT OF PORTION 5 OF THE FARM VALSCHVLEI NO 352-IT: DEVELOPMENT MATTERS

We refer to the enquiry herein. It is hereby confirmed that Kevin Neil Kritzinger as registered Town and Regional Planner (Membership: TRP(SA):- 813) or Professional Planner (Membership:- Pr.Plan A/813/1995) can report as follows:

1. The land is certainly not located within a town planning scheme area:- Hence no zoning certificate can be obtained.
2. Any rights allocated to the land should be as per a consent use granted by a provincial authority, which may or may not involve input as per the title conditions.
3. The land is subjective to title conditions as per the **Advertising on Roads and Ribbon Development Act, 1940 (Act 21 of 1940)**:- There should be an approval related.
4. Any consents in respect of rights, should be available to a land owner:- The problem may be that the consent was issued years ago and to a previous land owner.
5. The originals of such should be available also on provincial authority files:- However such may be issued some years ago and by the past **Transvaal Provincial Government / Administration**.
6. With the change in dispensations, there was an administration change-over:- The land now falls within the **Mpumalanga Provincial Government**:- It is uncertain what the transfer of documentation was at any point in time, and specifically old documentation.
7. The record section at the present government offices is due to relocation of offices in dis-array:- It is thus impossible to trace the documentation copies.
8. The local authority has inherited the area when the **Mkhondo Local Municipality** was established.
9. The **Mkhondo Local Municipality** does not have access to data (may not have access to data:- If data is available from the local authority, it will be very surprising).
10. As a consultant, we are not aware where we can obtain data / documentation / information required, and hence we are issuing this communication.

We trust the information is found to be of value. The land should have rights, as the use has been in place for many years. Hence we do not know what to recommend as per obtaining proof of rights granted.

Yours faithfully

A handwritten signature in black ink, appearing to read "Kevin Kritzing". The signature is written in a cursive style with a horizontal line extending across the middle of the name.

KEVIN KRITZINGER TRP(SA)
Plan-2-Survey Africa Incorporated (87/03480/21)
Ref: k2484

MPUMALANGA PROVINCIAL GOVERNMENT

Building 6
No 7 Government Boulevard
Riverside Park
Nelspruit 1200
Republic of South Africa



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Republic of South Africa
Tel: +27 (0)13 766 6067/8
Fax: +27 (0)13 766 8295
Email: dardla@mpg.gov.za

Department: Agriculture, Rural Development and Land Administration
HEAD OFFICE

*Litiko Letekulima, kutfutukiswa
Kwetindzawo Tasemakhaya
Netekuphatwa Kwemhlaba*

*Departement van
Landbou, Landelike Ontwikkeling
en Grondadministrasie*

*umNyango wezokulima nokuTjala,
zokuThuthukiswa kweNdawo
zemaKhaya nokuPhathwa koMhlaba*

Enq: M Stoop

EON CONSULTING ATTENTION Roger James

Sir

RE: ZONING VALSCHVLEI 352 IT AND WESTOE 394 IT

Portion 7 of the farm Westoe 394IT is zoned as Agriculture
Portions 13, 3, 5, 6, and 12 of the farm Valschvlei zoned as "Agricultural"
Portion 16 of the farm Valschvlei is dual zoned for Agriculture and Industrial.

Also investigate with the Mkhondo Local Municipality, as applications could have been submitted in terms Ordinance 15 of 1986, to the said Municipality for Township Establishment.

Yours faithfully



MR CHP KLEYNHANS
ACTING DIRECTOR: LAND ADMINISTRATION

02-07-2013
DATE

**THE DIRECTORS : FARMSECURE ENERGY (PTY)
LTD**

Our Ref: SVDM/CF/MAT38020

Your Ref: Ms Annerette Immelman & Ms

Isabelle Barnard

E-mail: chanel@vfv.co.za

Fax2Mail: 086 645 7742

Date: 08/07/2013

Dear Sir / Madam

**LAZybEND AND BUSBY SAWMILLS : ZONING OF PORTIONS OF THE FARMS VALSCHVLEI AND
WESTOE**

We refer to our consultation on 4 July 2013. We were presented with a copy of a letter addressed to the Directors of Busby Sawmills (Pty) Ltd by Plan 2 Survey Africa on 28 February 2011, as well as a zoning certificate issued by the Mpumalanga Provincial Government on 2 July 2013.

Without having had the benefit of an in depth investigation we wish to confirm as follows:

1. Insofar as the farms have been zoned "agricultural", Mr Kritzinger in his letter correctly states that the operations of a sawmill on the respective properties could only have been made possible by a consent use granted by the Provincial authority. These may well have been issued by the old Peri Urban Areas Board, which has since closed down and whose authority was then taken over by the various local authorities.
2. A consent use allows for only a single use on the whole property, and the question would then be whether the proposed business of energy generation can be considered to be by-product and/or ancillary to the current use of a sawmill. The initial indications are that this can indeed be argued to be the case.

Partners: SW van der Merwe B Proc LLM Tax • G Ferreira B Proc LLM Dip Insol CFE

• JJ van Wyk B Com B Proc Dip Insol • MM Dingiswayo B Proc H Dip (Co-Law)

• MR Maritz BA LLB • BJ Louw LLB

Managing: SW van der Merwe • MM Dingiswayo

Professional Assistants: HC Beukes LLB • C Du Plessis BLC LLB (UP) LLM (Law of Contracts)(UP) • C Ferguson B Com LLB • A Patel B Com LLB • SAS van Zyl LLB (UP)

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3. As discussed, should the further use to which the property will be put not be capable of being defined as a natural by-product of and ancillary to the business currently being conducted, this would entail a fully-fledged rezoning application which would in essence require township establishment on the property.


We are however of the opinion that this will not be necessary, provided as stated that the further use be of the nature and import as discussed above.

Should you wish us to further investigate the matter, please let us know. In such a case we would advise that a town planner also be instructed to assist and that we be supplied with full and detailed particulars of the current use and future processes to be followed on the property

Yours Faithfully

VFV ATTORNEYS

Per: Schalk van der Merwe

P.P. 

APPENDIX 6:
Site Photographs

Busby Renewables Plant: Site Photos (Assessment Phase)



Figure 1: Existing Boiler, where facilities will be erected



Figure 2: Area North from the existing boiler, where the new facilities will be erected



Figure 3 : Area East from the existing boiler, where the new facilities will be erected



Figure 4: Area West from the existing boiler, where the new facilities will be erected



Figure 5: Area North East from the existing boiler, where the new facilities will be erected



Figure 6: Area South West from the existing boiler, where the new facilities will be erected



Figure 7: Area West from the existing boiler, where the new facilities will be developed



Figure 8: Area North West from the existing boiler, where the new facilities will be developed



Figure 9: Area West from the existing boiler, where the new facilities will be developed



Figure 10: Area West from the existing boiler, where the new facilities will be developed



Figure 11: Area North West from the existing boiler, where the new facilities will be developed



Figure 12: The current electricity distribution infrastructure on site, where the connection to the grid will be established



Figure 13: The current electricity distribution infrastructure on site, where the connection to the grid will be established

APPENDIX 7:
Facility Illustration



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FOR PROPOSAL PURPOSE ONLY

08	AIR COOLED CONDENSER				
07	AUX. COOLING TOWER				
06	AHP/ESP MCC CONTROL ROOM				
05	SILLO				
04	CHIMNEY		12	TRANSFER TOWER	
03	ESP		11	GRIZZLY HOPPER	
02	BOILER		10	DM TANKS	
01	STG BUILDING		09	WATER TREATMENT PLANT	
SR.NO.	DESCRIPTION	REMARKS	SR.NO.	DESCRIPTION	REMARKS

REV. NO	DATE	DESCRIPTION	STATUS	PPD. BY	MECH.	CIVIL	ELEC.	C & I	APPD. BY	PPD. BY	MECH.	CIVIL	ELEC.	C & I	APPD. BY
DETAIL ENGG. CONSULTANT										THERMAX					

CLIENT : FARMSECURE CARBON (PTY) LTD SOUTH AFRICA		THERMAX LIMITED POWER DIVISION SAI CHAMBERS WAKDEWADI, PUNE, INDIA			
OWNER'S ENGINEER :		DRAWN : YDS DESIGNED : UT CHECKED : SB APPROVED : SA			11/05/2012 11/05/2012 11/05/2012 11/05/2012
PROJECT : 1x10 MW COGEN POWER PLANT				DEC :	
TITLE : PLOT PLAN				GROUP: MECH, OC No.: -- SCALE: 1:400	
DWG.NO. CC FCS M 201 1				REV. 0	



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