



Vaporox (Pty) Ltd

**Waste Tyre Pyrolysis Plant – Waste
Management Licence Application –
draft Basic Assessment Report**

Locality: Mogwase, North West Province

Departmental Ref No: NWP/WM/BP3/2013/14

Date: 19 November 2014

SHANGONI
Management Services (Pty) Ltd



DRAFT BASIC ASSESSMENT REPORT

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19 November 2014

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PROJECT DETAILS

North West Department of Rural, Environmental and Agricultural Development

Reference No.: NWP/WM/BP3/2013/14

Project Title: Vaporox Waste Tyre Pyrolysis Plant – Waste Management Licence Application

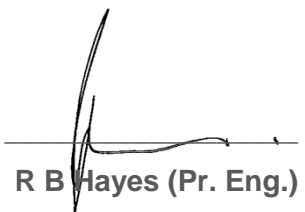
Project Number: INN-NOR-13-09-02

Compiled by: Karien du Plessis

Date: 19 November 2014

Location: Mogwase, North West Province

Technical Reviewer: Brian Hayes


R B Hayes (Pr. Eng.)



EXECUTIVE SUMMARY

The Applicant

The applicant is Vaporox (Pty) Ltd. They are planning to lease the proposed site from the landowner, the North West Development Corporation (Pty) Ltd.

Background description

The Waste Tyre pyrolysis plant is proposed for an industrial site that is currently unused. The site was used for industrial purposes in the past and has existing buildings, road infrastructure and bulk service supplies.

The pyrolysis process is an effective way to eliminate the present build-up of waste tyres in South Africa.

Project description

The proposed project entails the installation/construction of a Pyrolysis Plant at an existing facility (existing buildings and associated infrastructures) for the pyrolysis of waste tyres.

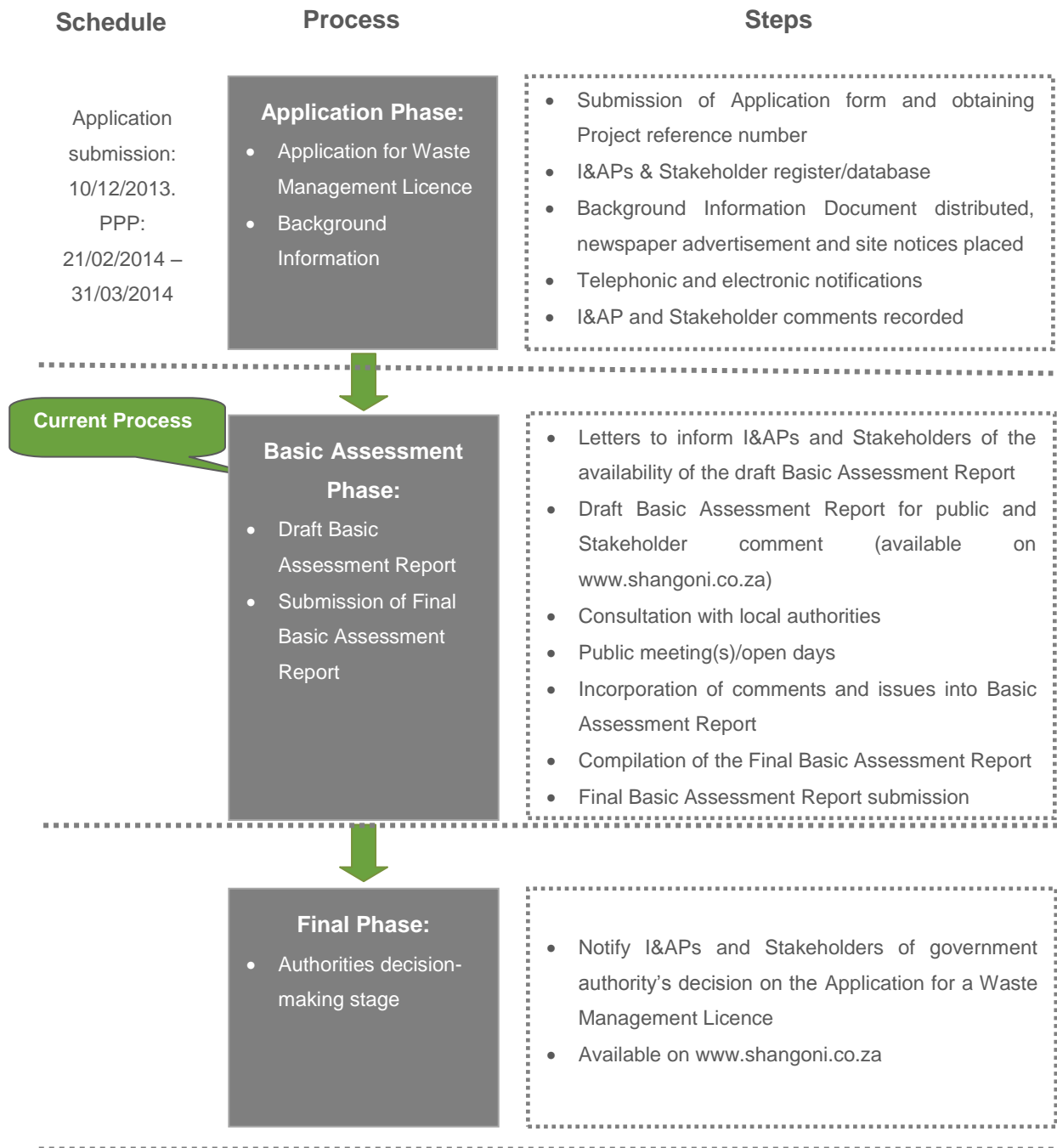
Legal requirements and legislative process

Proposed waste management activities at the proposed Vaporox Waste Tyre Pyrolysis Plant trigger listed waste management activities in terms of the National Environmental Management: Waste Act, Act 59 of 2008 (NEM:WA, 2008) and the regulations there under. Relevant listed activities triggered by the proposed activities are described further in this Basic Assessment Report (BAR) (refer to Part 1.5).

It is the intention of this report to provide the necessary information pertaining to the proposed activities associated with the project, as required in terms of the NEM:WA, 2008, and the Environmental Impact Assessment Regulations (EIA Regulations R543: EIA Regulations in terms of Chapter 5 of the NEMA, 1998, dated June 2010). This draft Basic Assessment Report intends to highlight all information relevant to the proposed Waste Tyre Pyrolysis project.

The diagram below provides a visual representation of the approach followed for the Basic Assessment in terms of NEMA, 1998, and the Environmental Impact Assessment Regulations, dated 2010.





Anticipated impacts

The purpose of this document is to supply the North West Department of Rural, Environmental and Agricultural Development with the requested information pertaining to the National Environmental Management Act (NEMA), as amended, Regulation 28 of the Environmental Impact Assessment Regulations, dated 2010, and the National Environmental Management Waste Act, 2008 (Act No. 59 of 2008). Contained in this document is a detailed investigation of the activity and site-specific potential impacts associated with the proposed waste tyre pyrolysis plant.

The application for a Waste Management Licence entails conducting a Basic Environmental Impact Assessment Process, as Category A activities in terms of Government Notice No. 921 of 29 November 2013 are being proposed.

Regulation 22 (of Regulation 543) of the EIA Regulations, 2010, under the NEMA, 1998, requires that a Basic Assessment Report (BAR) includes an assessment of the status; extent; duration; probability; reversibility; replaceability of resources and mitigatory potential of the major potential environmental impacts of the proposed project be undertaken. Refer to Part 7 for a detailed risk assessment.

Potential significant impacts that have been identified during the basic assessment process are:



Potential Impact	Environmental Significance Pre Mitigation			Environmental Significance Post Mitigation		
	P ¹	M ²	S ³	P	M	S
Planning and Design						
Harm to the environment due to inadequate design of the Waste Tyre Pyrolysis Plant	2	3	M	1	2	L
Harm to the environment due to inadequate design of the pyrolysis oil, chemical and LPG storage vessels	2	3	M	1	3	L
Harm to the environment due to inadequate design of the waste tyre storage area	2	2	L	1	2	L
Harm to the environment due to inadequate design of the ablution facilities	2	2	L	1	2	L
Harm to the environment due to inadequate design of the sewage pipeline system	2	3	M	1	2	L
Wastage of valuable resources due to the inadequate design of the water storage vessels	2	2	L	1	1	L
Wastage of valuable resources due to the inadequate design and operation of the backup generator	2	2	L	1	1	L
Delays, non-compliances to the EA and EMP and harm to the environment due to ineffective planning	3	3	M	1	2	L
General Environment						
Construction Phase: Harm to the environment in general	3	2	M	2	2	L
Operational Phase: Harm to the environment in general	3	3	M	2	2	L
Atmosphere and Noise						
Construction Phase: Noise pollution	4	3	H	3	3	M
Operational Phase: Disturbance and nuisance to adjacent receptors due to noise generation	4	2	M	3	1	L
Soil						
Construction Phase: Degradation and loss of topsoil	3	3	M	2	2	L
Operational Phase: Soil erosion	3	2	M	2	1	L
Soil, stormwater and groundwater pollution						
Construction Phase: Soil, stormwater and groundwater pollution due to spillages and/or improper handling, storage, mixing or disposal of cement and concrete	3	3	M	2	2	L
Construction Phase: Soil, stormwater and groundwater pollution due to poor management and accidental spills of hazardous chemicals	3	3	M	2	2	L

CHAP

¹ Probability

² Magnitude

³ Severity



Potential Impact	Environmental Significance Pre Mitigation			Environmental Significance Post Mitigation		
	P ¹	M ²	S ³	P	M	S
Construction Phase: Soil, stormwater and groundwater pollution due to poor waste management	4	2	M	2	2	L
Construction Phase: Soil, stormwater and groundwater pollution due to unsanitary conditions onsite	3	3	M	1	2	L
Construction Phase: Soil and water pollution due to contaminated wash water entering the environment	3	3	M	2	2	L
Construction Phase: Hydrocarbon pollution of soil, stormwater and groundwater	3	3	M	2	2	L
Operational Phase: Soil, stormwater and groundwater pollution due to poor management and accidental spills of hazardous chemicals	4	4	H	3	3	M
Operational Phase: Soil, stormwater and groundwater pollution due to poor waste management	3	3	M	2	2	L
Operational Phase: Soil, stormwater and groundwater pollution due to unsanitary conditions onsite	3	3	M	2	2	L
Operational Phase: Soil, stormwater and groundwater pollution due to contaminated wash water entering the environment	3	3	M	2	2	L
Operational Phase: Soil and groundwater pollution from leaking or broken sewerage pipes	3	3	M	1	3	L
Operational Phase: Contamination of clean stormwater runoff	4	3	H	2	2	L
Operational Phase: Soil, stormwater and groundwater pollution due to incorrect storage of waste and shredded tyres	3	4	H	2	2	L
Operational Phase: Soil, stormwater and groundwater pollution due to inadequate storage of pyrolysis oil	4	3	H	2	2	L
Operational Phase: Leaching of zinc and sulphur due to inadequate storage of ash	3	3	M	1	3	L
Resources						
Construction Phase: Wastage or depletion of valuable resources like water and electricity due to inefficient or redundant usage	3	2	M	2	2	L
Operational Phase: Wastage or depletion of water due to leaking or broken water pipelines and water storage vessels	3	2	M	2	2	L
Operational Phase: Wastage of diesel due to inefficient or ineffective operation of the backup generator	3	3	M	2	2	L
Operational Phase: Wastage or depletion of valuable resources, such as LPG and water, due to inefficient or ineffective operation of the Waste Tyre Pyrolysis Plant	3	2	M	2	2	L
Workers' Safety						
Construction Phase: Injury of employees and contractors working on the site	3	3	M	2	2	L
Construction Phase: Failure of the LPG storage tank due to inadequate construction	3	3	M	1	3	L
Construction Phase: Failure of the pyrolysis oil storage tank(s) due to inadequate construction	3	3	M	1	3	L
Operational Phase: Injury of employees working on site	3	3	M	2	2	L
Operational Phase: Explosions, fires and harm to employees due to the incorrect storage of LPG	3	4	H	2	3	M
Operational Phase: Fires and harm to employees due to the incorrect storage of pyrolysis oil	3	4	H	2	3	M

Potential Impact	Environmental Significance Pre Mitigation			Environmental Significance Post Mitigation		
	P ¹	M ²	S ³	P	M	S
Heritage						
Construction Phase: Disturbance or destruction of sites, features or artefacts of archaeological and/or historical importance	1	3	L	1	2	L
Operational Phase: Disturbance or destruction of sites, features or artefacts of archaeological and/or historical importance	1	3	L	1	2	L
Infrastructure						
Construction Phase: Wear of access roads, accidents on access roads, unpermitted transport of materials and loss of materials being transported on access roads	4	2	M	2	2	L
Operational Phase: Wear of access roads, accidents on access roads, unpermitted transport of materials and loss of materials being transported on access roads	4	2	M	2	2	L



Appropriate mitigation measures will assist in minimising the potential impacts on the surrounding environment during the construction and operational phases of the development. A draft Environmental Management Programme (EMP) has been compiled, with the aim of serving as a working document in order to manage and/or mitigate the identified potential impacts. Refer to Appendix F for a copy of the draft EMP.

The main mitigation measures identified in this Basic Assessment include the following:

- All employees are required to attend onsite Environmental Awareness Training prior to commencing work on site. Continuous training should also be provided to employees working with waste.
- A complaints register must be kept onsite. The register must record the following: Date when complaint was received, name of person who reported the complaint, details of the complaint and when and how concern was addressed.
- The relevant stipulations of the Noise Control Regulations, 1992 (Government Notice No. 154 of 10 January 1992) must be adhered to.
- The management of waste must be in accordance with the stipulations of the municipal Solid Waste By-law (2013).
- The Waste Tyre Pyrolysis Plant must be registered on the South African Waste Information System.
- Monitoring, auditing, reporting and record keeping must be conducted in accordance with GNR. 926 of 29 November 2013.
- Cleaning of tyres using compressed air instead of water should be considered.
- The site must have an adequate and effective stormwater management system in place.
- The waste tyre storage area must have an impermeable surface, such as a concrete slab.
- Purified oil must be stored in suitably designed storage tanks, contained within an impermeable bund area.

Based on the outcomes of the Environmental Impact Assessment conducted as part of this Basic EIA as well as the alternatives assessment, the following recommendations are made:

1. The proposed project/activity (the construction and operation of the Waste Tyre Pyrolysis Plant) should be authorised and allowed to proceed on the preferred site (25°16'12.40"; 27°16'25.36").
2. The mitigation measures proposed in this report and the draft Environmental Management Programme must be implemented during all phases of the proposed project.
3. It is assumed that the mitigation measures proposed in this report and the draft Environmental Management Programme will be correctly implemented by the applicant and that they will be effective.
4. A communications pathway must be established that would allow the designated ECO to accept and deal with stakeholder complaints.
5. Proposed mitigation measures should be incorporated as far as possible into the operational plan for the plant.



6. Strict monitoring and enforcement of requirements of the EMP must be undertaken to ensure that contractors and operators adhere to these requirements.



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DEFINITIONS

Building and Demolition Waste

Means waste, excluding hazardous waste, produced during the construction, alteration, repair or demolition of any structure, and includes rubble, earth, rock and wood displaced during that construction, alteration, repair or demolition [*NEM: WA, (Act No. 59, 2008)*].

Demography

The scientific study of human population, especially, with reference to their size, structure and distribution.

Domestic Waste

Means waste, excluding hazardous waste, that emanates from premises that are used wholly or mainly for residential, educational, health care, sport or recreation purposes [*NEM: WA, (Act No. 59, 2008)*].

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). micro-organisms, plant and animal life;
- (iii). any part or combination of (i) and (ii) and the interrelationships among and between them; and
- (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; usually refers to damage occurring accidentally or intentionally as a result of human activities.

Environmental Impacts

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



Environmental Impact Assessment

A study of the environmental consequences of a proposed course of action.

Environmental Impact Report

A report assessing the potential significant impacts as identified during the environmental impact assessment.

Environmental impact

An environmental change caused by some human act.

General Waste

Means waste that does not pose immediate hazard or threat to health or to the environment, and includes-

- (a) domestic waste;
- (b) building and demolition waste;
- (c) business waste; and
- (d) inert waste [*NEM: WA, (Act No. 59, 2008)*].

Hazardous waste

Means any waste that contains organic or inorganic elements compounds that may, owing to the inherent physical, chemical or toxicological characteristics of that waste, have a detrimental impact on health and the environment [*NEM: WA, (Act No. 59, 2008)*].

Land use

The various ways in which land may be employed or occupied. Planners compile, classify, study and analyse land use data for many purposes, including the identification of trends, the forecasting of space and infrastructure requirements, the provision of adequate land area for necessary types of land use, and the development or revision of comprehensive plans and land use regulations.

Pollution

Pollution means any change in the environment caused by -

- (i) substances;
- (ii) radioactive or other waves; or
- (iii) noise, odours, dust or heat,

emitted from any activity, including the storage or treatment of waste or substances, construction and the provision of services, whether engaged in by any person or an organ of state, where that change has an adverse effect on human health or wellbeing or on the composition, resilience and productivity



of natural or managed ecosystems, or on materials useful to people, or will have such an effect in the future [NEM: WA, (Act No. 59, 2008)].

Pollution Prevention

Any activity that reduces or eliminates pollutants prior to recycling, treatment, control or disposal.

Public Participation Process

A process of involving the public in order to identify needs, address concerns, in order to contribute to more informed decision making relating to a proposed project, programme or development.

Recovery

In terms of the Waste Tyre Regulations, 2009, means the controlled extraction of a material or the retrieval of energy from waste tyres.

Recycle

In terms of the Waste Tyre Regulations, 2009, means the separation and processing of materials from waste tyres for further use as new products or resources.

Registered Interested and Affected Party

In relation to an application, means an interested and affected party whose name is recorded in the register opened for that application.

Topography

Topography, a term in geography, refers to the "lay of the land" or the physio-geographic characteristics of land in terms of elevation, slope and orientation.

Tyre

In terms of the Waste Tyre Regulations, 2009, means a continuous pneumatic covering made of natural rubber or synthetic rubber or a combination of natural and synthetic rubber encircling a wheel, whether new, used or retreaded.

Vegetation

All of the plants growing in and characterising a specific area or region; the combination of different plant communities found there.



Waste

As per the definition of the National Environmental Management Waste Act, Act 59 of 2008 - 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.

Waste Tyre

In terms of the Waste Tyre Regulations, 2009, means a new, used, retreaded, or un-roadworthy tyre, not suitable to the retreaded, repaired, or sold as a part worn tyre and not fit for its original intended use.

Waste Tyre Processor

In terms of the Waste Tyre Regulations, 2009, means any person or entity that is engaged in the commercial re-use, recycling or recovery of waste tyres.



ABBREVIATIONS

BAR	-	Basic Assessment Report
BID	-	Background Information Document
CRR	-	Comments and Response Report
EAP	-	Environmental Assessment Practitioner
ECA	-	Environmental Conservation Act, 1989 (Act No. 73 of 1989)
EIA	-	Environmental Impact Assessment
EIR	-	Environmental Impact Report
EMF	-	Environmental Management Framework
EMP	-	Environmental Management Programme
GN	-	Government Notice
I&AP	-	Interested and Affected Party
IDP	-	Integrated Development Plan
NEMA	-	Environmental Management Act, 1998 (Act No. 107 of 1998) as amended
NEM:WA	-	National Environmental Management: Waste Act, 2008 (Act No. 59 of 2008)
NW READ	-	North West Department of Rural, Environmental and Agricultural Development
R	-	Regulation
SAHRA	-	South African Heritage Resources Agency
SWMP	-	Storm Water Management Plan



1. INTRODUCTION

This draft Basic Assessment Report forms part of an application for a Waste Management Licence for waste management activities associated with the proposed Vaporox Waste Tyre Pyrolysis Plant in Mogwase, North West Province. The application is made in terms of the National Environmental Management: Waste Act, 2008 (Act No. 59 of 2008) and Government Notice No. 921 of 29 November 2013.

The application process is undertaken on behalf of the applicant, Vaporox (Pty) Ltd, by Shangoni Management Services (Pty) Ltd. Shangoni was appointed, as independent environmental practitioner, to assist the applicant in undertaking the process as prescribed in the before mentioned environmental legislation.

A Waste Management Licence Application was submitted to the identified competent authority (the North West Department of Rural, Environmental and Agricultural Development). The Department subsequently registered the project and the formal Basic Assessment Process was thereby initiated.

This BAR is divided into the following parts:

- Part 1: Introduction (including a description of the project).
- Part 2: Nature and extent of the environment affected by activity.
- Part 3: Applicable legislation and guidelines.
- Part 4: Public Participation Process.
- Part 5: Need and desirability for the activity
- Part 6: Consideration of alternatives.
- Part 7: Environmental Impact Assessment
- Part 8: Environmental Impact Statement
- Part 9: Conclusion.

1.1 Process followed

1.1.1 The BAR in terms of the requirements of NEMA, 1998

Regulation 22(2) of the EIA Regulations, 2010 under the NEMA, 1998, lists aspects that must be included in Basic Assessment Reports (BARs). Table 1 below indicates the parts where information has been provided as part of this BAR:

Table 1: The BAR in terms of the EIA Regulations, 2010, under the NEMA, 1998

Regulation No:	Description	BAR Part
R543 Regulation 22(2)(a)	Details of the Environmental Assessment Practitioner (EAP).	Part 1 & Appendix G

Regulation No:		Description	BAR Part
	(i)	Details of the EAP who prepared the report.	
	(ii)	Details of the expertise of the EAP to carry out the environmental impact assessment.	
R543 Regulation 22(2)(b)		A description of the proposed activity.	Part 1
R543 Regulation 22(2)(c)		A description of the property on which the activity is to be undertaken and the location of the activity on the property.	Part 1
R543 Regulation 22(2)(d)		A description of the environment that may be affected by the activity and the manner in which the physical, biological, social, economic and cultural aspects of the environment may be affected by the proposed activity.	Part 2
R543 Regulation 22(2)(e)		An identification of all legislation and guidelines that have been considered in the preparation of the basic assessment report.	Part 3
R543 Regulation 22(2)(f)		Details of the public participation process conducted:	Part 4 & Appendix E
	(i)	Steps taken to notify potentially interested and affected parties of the proposed activity.	
	(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 as interested and affected parties.	
	(iv)	A summary of the issues raised by interested and affected parties, the date of receipt and the response of the EAP to those issues.	
R543 Regulation 22(2)(g)		A description of the need and desirability of the proposed activity.	Part 5
R543 Regulation 22(2)(h)		A description of identified potential alternatives to the proposed activity, including advantages and disadvantages that the proposed activity or alternatives may have on the environment and the community that may be affected by the activity.	Part 6, 7 & 8
R543 Regulation 22(2)(i)		An assessment of each identified potentially significant impact, including:	Part 7
	(i)	Cumulative impacts.	
	(ii)	The nature of the impact.	
	(iii)	The extent and duration of the impact.	
	(iv)	The probability of the impact occurring.	



Regulation No:	Description	BAR Part
	(v) The degree to which the impact can be reversed.	
	(vi) The degree to which the impact may cause irreplaceable loss of resources.	
	(vii) The degree to which the impact can be mitigated.	
R543 Regulation 22(2)(j)	Any environmental management and mitigation measures proposed by the EAP	Part 7 and Appendix F
R543 Regulation 22(2)(k)	Any inputs and recommendations made by specialists to the extent that may be necessary.	Parts 7
R543 Regulation 22(2)(l)	A draft environmental management programme containing the aspects contemplated in regulation 33.	Appendix F
R543 Regulation 22(2)(m)	A description of any assumptions, uncertainties and gaps in knowledge.	Part 9 (If applicable)
R543 Regulation 22(2)(n)	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.	Part 9
R543 Regulation 22(2)(o)	Any representations and comments received in connection with the application or the basic assessment report.	Part 4
R543 Regulation 22(2)(p)	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.	Appendix E
R543 Regulation 22(2)(q)	Any responses by the EAP to those representations, comments and views.	Appendix E
R543 Regulation 22(2)(r)	Any specific information that may be required by the competent authority.	N/A*
R543 Regulation 22(2)(s)	Any other matters required in terms of sections 24(4)(a) and (b) of the Act.	N/A*

* No specific requests have been received from the competent authorities to date.

1.2 Details of the project applicant

Name of Applicant	Vaporox (Pty) Ltd
Postal Address	PO Box 1856, Heidelberg, 1438
Fax No.	086 679 0029
Email Address	mavimbta@vodamail.co.za
Landowner	North West Development Corporation (Pty) Ltd
Farm name and portion on which the activities take place	Portion 0 of Erf 37, Bodirelo Township, JQ, North West Province

Title Deed Number and 21 Digit Code	T0JQ00840000003700000
Co-ordinates of operation	25°16'12.40"; 27°16'25.36"

1.3 Details of the Project Coordinator

Name of firm	Innovative Business Systems (Pty) Ltd
Contact Person	Ditebogo N. Sebesho
Postal address	PostNet Suite #264 Private Bag X21 Bryanston 2021
Telephone No.	072 905 0913
Fax	086 226 2590
E-mail	ditebogo@ibs-africa.com

Innovative Business Systems (Pty) Ltd

Innovative Business Systems specialises in setting up and the implementation of management systems. Service offerings include:

- Management Systems Consulting;
- System Optimisation;
- Technical Audits;
- Quality Assurance;
- Outsourcing; and
- Project Coordination/Management.

1.4 Appointed Environmental Assessment Practitioner

Name of firm	Shangoni Management Services (Pty) Ltd.
Postal address	PO Box 74726 Lynwood Ridge Pretoria 0040
Telephone No.	(012) 807 7036
Fax	(012) 807 1014/086 643 5360
E-mail	lizette@shangoni.co.za



Team of Environmental Assessment Practitioners on project		
Name	Qualifications & experience to conduct the EIA	Responsibility
Mr Lourens de Villiers	<ul style="list-style-type: none"> • MSc. Water Resource Management (UP) • BSc. (Hons) (PU for CHE) • More than 12 years' experience conducting Environmental Impact Assessments and Waste Management Licence Applications 	Project Director
Ms Lizette Crous	<ul style="list-style-type: none"> • Post Graduate Certificate Environmental Management (University of London) • 3 years' experience conducting Environmental Impact Assessments and Waste Management Licence Applications 	EAP
Ms Patricia van der Walt	<ul style="list-style-type: none"> • B.Sc. (Hons) (Applied Science in Environmental Technology) • 3 years' experience conducting Environmental Impact Assessments, Waste Management Licence Applications and Atmospheric Emission Licence Applications. 	EAP
Ms Karien du Plessis	<ul style="list-style-type: none"> • B.Sc. (Hons) Environmental Management • Less than 1 years' experience conducting Environmental Impact Assessments and Waste Management License Applications. 	EAP

* Detailed CV's for the project team are attached (Appendix G).

1.5 Current situation

Currently, waste tyres are disposed of at landfill sites, where they take up valuable air space, and are stockpiled or dumped in residential, rural and industrial areas across South Africa. Some tyres are recycled, but many are burned, releasing oils that seep into the ground and noxious gases such as carbon monoxide and dioxins (www.redisa.org.za). Burning one ton of waste tyres produces approximately 450kg of toxic gases (Splainex Ecosystems Ltd, 2009-2011). In some rural areas, waste tyres are also burnt to generate heat, especially in winter months, resulting in health risks to those inhaling the resultant fumes (www.redisa.org.za). In terms of the Waste Classification and Management Regulations (NEM: WA) of 23 August 2013, tyres are seen as general waste and do not require classification (Annexure 1 of the regulations).

The Waste Tyre pyrolysis plant is proposed for an industrial site that is currently unused. The site was used for industrial purposes in the past and has existing buildings, road infrastructure and bulk service supplies.



1.6 Proposed activity(ies)

It is estimated that there are approximately 60 million legacy waste tyres in South Africa. These tyres take up space at landfill sites or are burnt, releasing noxious gases such as carbon monoxide and dioxins.

Recycling of waste tyres is one way to eliminate the above mentioned problem. This can be achieved through waste tyre pyrolysis. Pyrolysis is defined as thermal decomposition in an oxygen-free environment.

At the proposed plant, waste tyres will be delivered by truck, weighed and stockpiled outside. The tyres will then be cleaned and conveyed into a shredder to produce chips. Thereafter, the shredded tyres will be fed into a pyrolysis reactor vessel that is devoid of oxygen. The reactor will be a continuous fluidised based reactor. Combustion of the pyrolysis gases outside the cylinder will heat the tyre pieces and result in the decomposition of the rubber polymers into smaller molecules. Products from the proposed waste tyre pyrolysis process include oil, steel and char. The oil will be purified by first cracking it and then passing it through several reactors that are packed with catalysts. The purification process will remove carbon particles, sulphur and ash. The steel will be separated from the carbon black by using a magnet. The char will be further processed to Carbon black.

Produced oil will be stored in tanks and processed Carbon black will be stored in silos and bags. A backup generator will be installed for emergency situations or power failures and approximately 20m³ of water will be stored at the facility, possibly in JoJo tanks, for the cooler. The proposed waste tyre pyrolysis plant will be self-sustainable as the pyro-gas generated from the pyrolysis process will be used to run the reactor vessel. An external fuel source (LPG) will only be used to start up the reactor vessel and as soon as the process generates its own gases, the external fuel source will be shut off. Vaporox is also considering the installation of micro-turbines to use any excess gases produced in the pyrolysis process for the generation of electricity.

The proposed waste tyre pyrolysis plant will process approximately 95 tons of waste tyres per day and will operate 24 hours per day, seven days per week. The equipment will operate at between 400-600°C. At these operating conditions, 40 – 52% of the tyres will be converted into char, resulting in approximately 38 - 49.4 tons of char being produced per day (EPA, 1993). The waste tyres will be sourced from trucking companies, tyre dealers and nearby mines. Tyres up to tractor size will be used in the process. Approximately seven day's stock of waste tyres (±665 tons) will be stored at the site prior to processing. Off-site storage of tyres is also a possibility.



A general pyrolysis process flow is shown in the figure below.

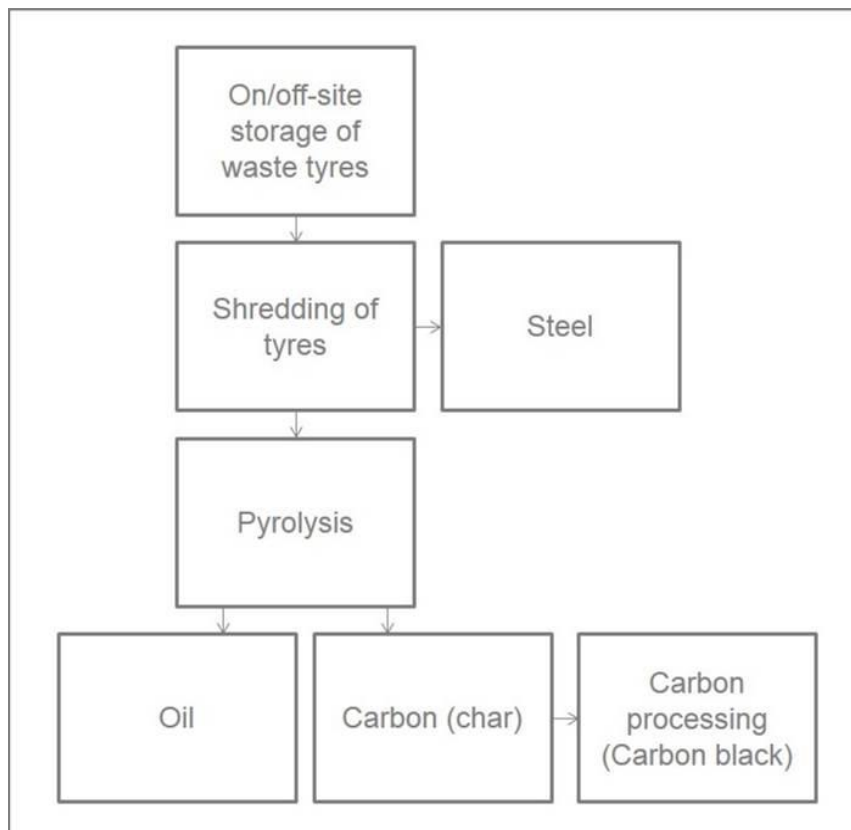


Figure 1: General pyrolysis process flow diagram

The following listed activities in terms of the National Environmental Management: Waste Act, 2008 (Act 59 of 2008) are being applied for:



Table 2: Listed activities in terms of GN. No R 921, dated 2013 under NEM:WA, 2008

Number and date of the relevant notice	Activity No	Description
Governmental Notice No. 921 of 29 November 2013 - Category A	2	The sorting, shredding, grinding, crushing, screening or bailing of general waste at a facility that has an operational area in excess of 1 000m ² .
Governmental Notice No. 921 of 29 November 2013 - Category A	3	The recycling of general waste at a facility that has an operational area in excess of 500m ² , excluding recycling that takes place as an integral part of an internal manufacturing process within the same premises.
Governmental Notice No. 921 of 29 November 2013 - Category A	5	The recovery of waste including the refining, utilisation, or co-processing of waste in excess of 10 tons but less than 100 tons of general waste per day or in excess of 500kg but less than 1 ton of hazardous waste per day, excluding recovery that takes place as an integral part of an internal manufacturing process within the same premises.
Governmental Notice No. 921 of 29 November 2013 - Category A	12	The construction of a facility for a waste management activity listed in Category A of this Schedule (not in isolation to associated waste management activity).



1.6.1 Proposed locality

The proposed site for the Waste Tyre pyrolysis plant is located on Portion 0 of Erf 37, Bodirelo Township, JQ, Mogwase, North West Province. The site is situated within the Moses Kotane Local Municipality of the Bojanala Platinum District Municipality.

Table 3: Administrative and water management boundaries

Province	North West Province
District Municipality	Bojanala Platinum District Municipality
Local Municipality	Moses Kotane Local Municipality
Ward	10
Quaternary Catchment	A22F
Water Management Area (if applicable)	Crocodile (West) and Marico
Air Shed Priority Area	Waterberg-Bojanala National Air Shed Priority Area

Table 4: Direction and distance to the nearest towns

Closest town	Distance from site	Direction from site
Doringpoort	7km	North-west
Sun City	20km	South-west
Rustenburg	41km	South

The site locality map and layout plan are given in the figures below and are also attached in Appendix A. Site photographs are also provided after the site layout plan.



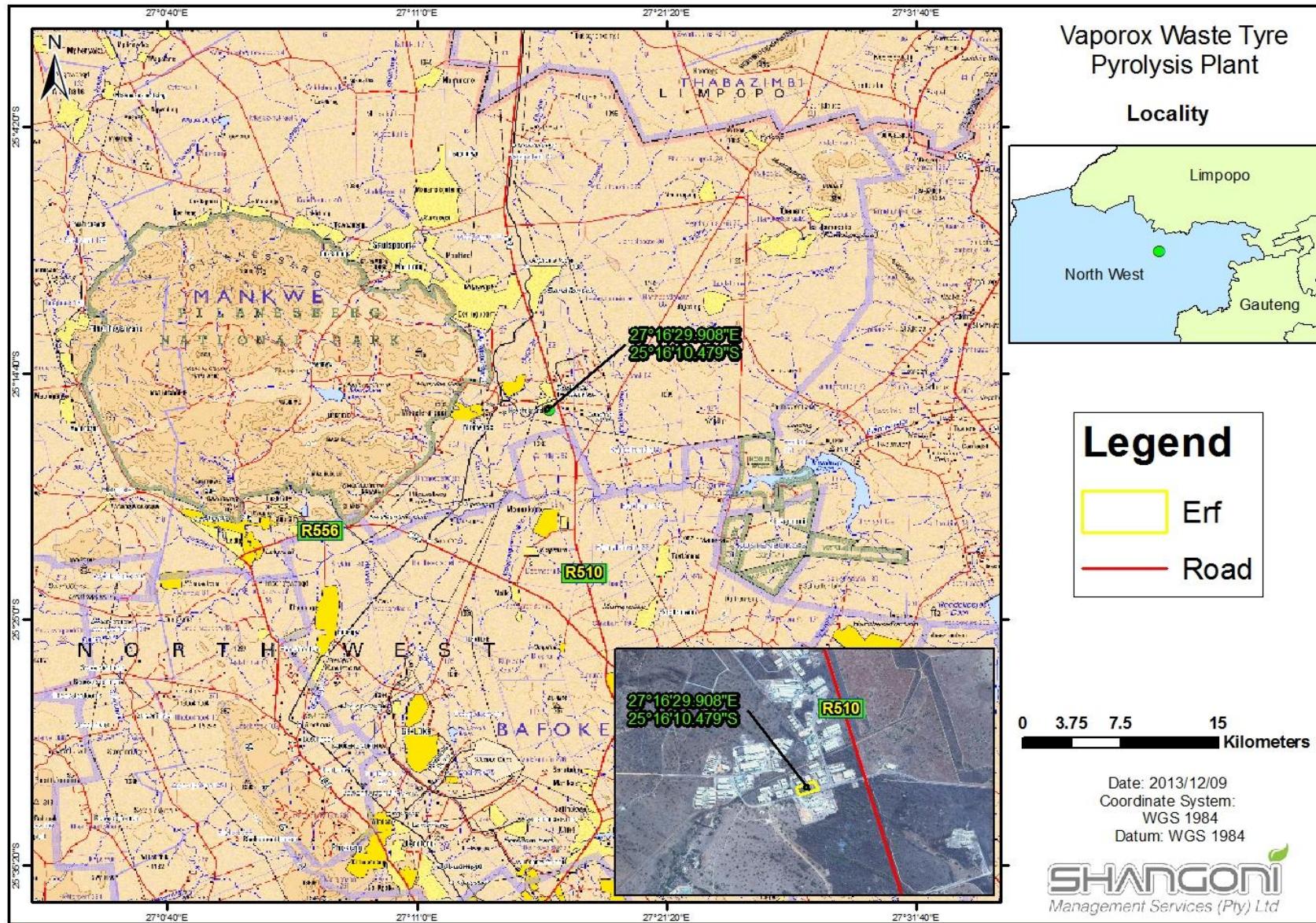




Figure 3: Site Layout Plan



Figure 4: Existing access to the site



Figure 5: Existing building 1





Figure 6: Existing building 2



Figure 7: Existing buildings (building 3 at the back on the right of the photograph)





Figure 8: Inside of building 1



Figure 9: Inside of building 2





Figure 10: Inside of building 3



Figure 11: Open piece of land to the east of the three existing buildings (1)





Figure 12: Open piece of land to the east of the three existing buildings (2)

1.6.2 Land tenure and use of immediately adjacent land

Most of the properties surrounding the proposed site are owned by the North West Development Corporation (Pty) Ltd and are used for industrial activities, such as steel works. There is also a bus service across the road from the site (Mvelatrans (Pty) Ltd t/a Bojanala Bus Services).

The adjacent land owners of the proposed site are listed in the table below and shown in the figure thereafter. Also refer to Part 4 for more detail regarding the Public Participation Process.

Table 5: Adjacent land owners of the proposed site

Adjacent Land Owner
North West Development Corporation (Pty) Ltd
Mvelatrans (Pty) Ltd t/a Bojanala Bus Services
New Era Recycling (Part of the New Era Group)
Durab Manufacturing
Four Tops Engineering Service CC



1.6.3 Design

The following figure shows a conceptual process flow for the proposed Waste Tyre Pyrolysis Plant. As the final design layouts and engineering drawings have not been finalised as yet, these layouts and drawings will be supplied to the Department once they have been finalised. These designs are also subject to confidentiality agreements.

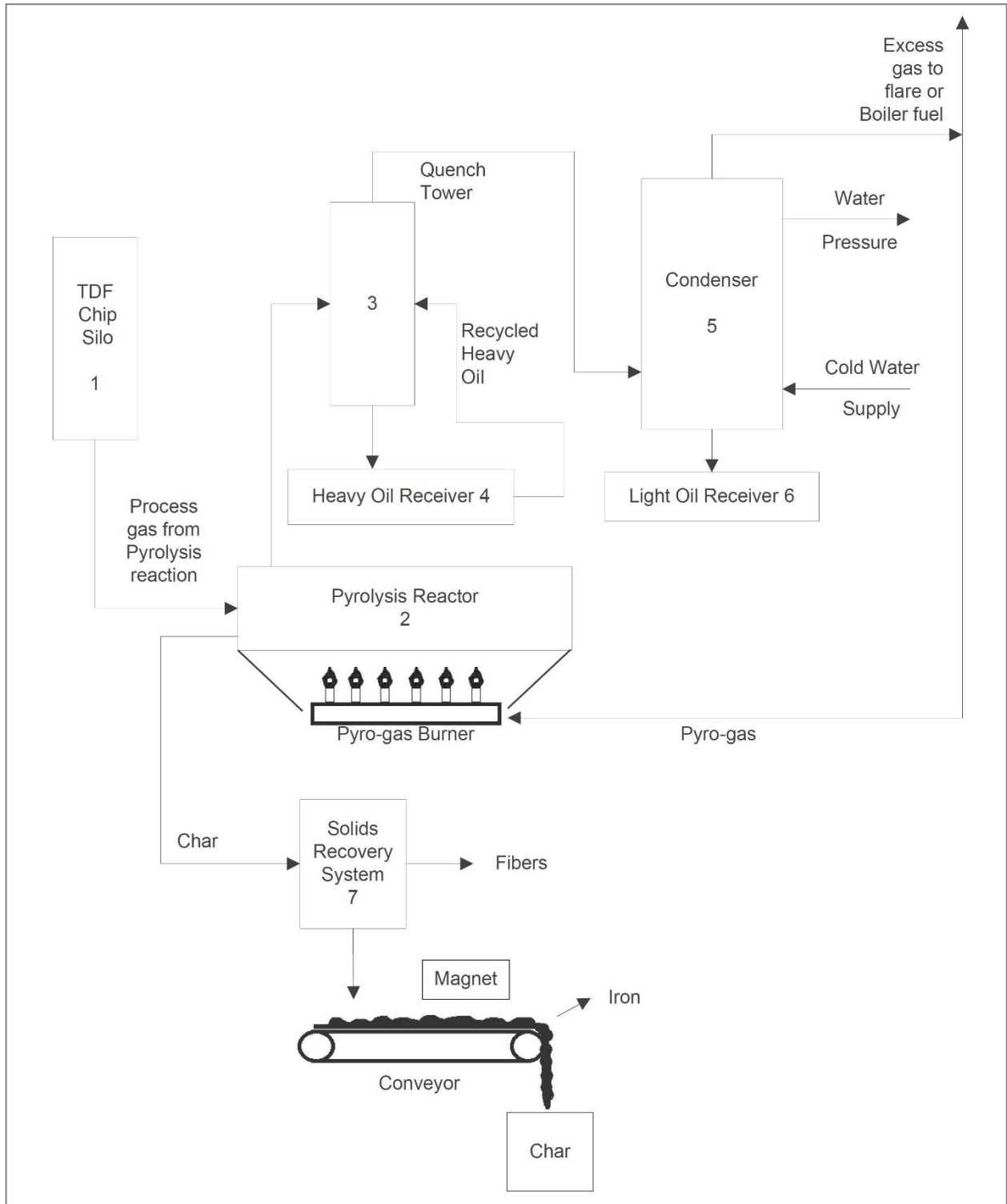
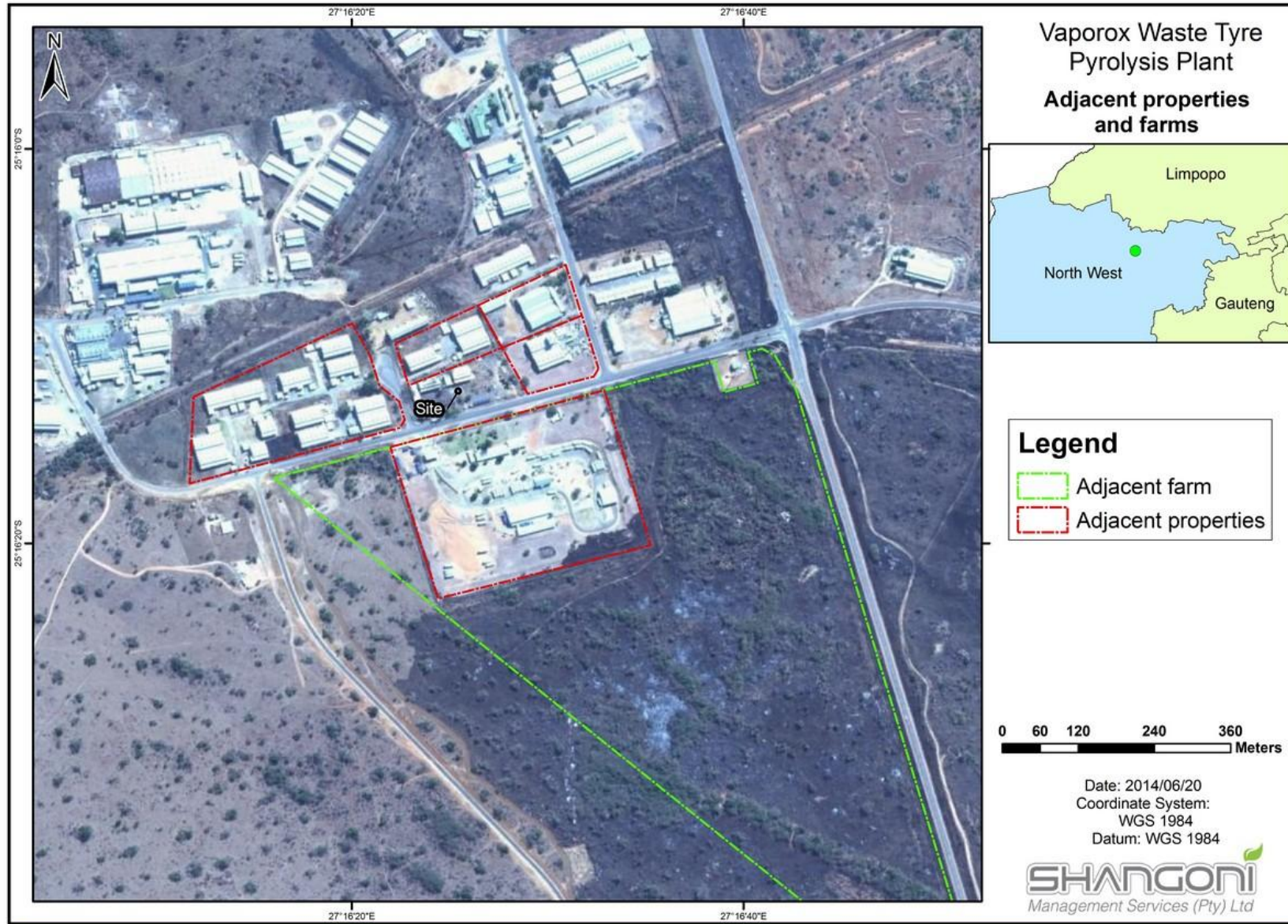


Figure 13: Conceptual waste tyre pyrolysis plant/system





2. NATURE AND EXTENT OF THE ENVIRONMENT AFFECTED BY ACTIVITY

2.1 Geology

According to Mucina & Rutherford (2006), the northern areas that are covered by Central Sandy Bushveld (the vegetation type of the site) are underlain by sedimentary rocks belonging to the Waterberg Group, Mokolian Erathem. These are mostly sandstone, shale and siltstone rocks of the Vaalwater Formation and sandstone, siltstone and conglomerate rocks of the Alma Formation. Large parts of the southern and eastern areas are underlain by granite rocks belonging to the Lebowa Granite Suite and granophyre (fine-grained igneous) rocks belonging to the Rashoop Granophyre Suite. Both of these suites belong to the Bushveld Complex, Vaalian (Mucina & Rutherford, 2006).

As shown in the figure below, the site is underlain by felsic, intermediate rocks of the Lebowa Granite Suite, Bushveld Complex (Vaalian).



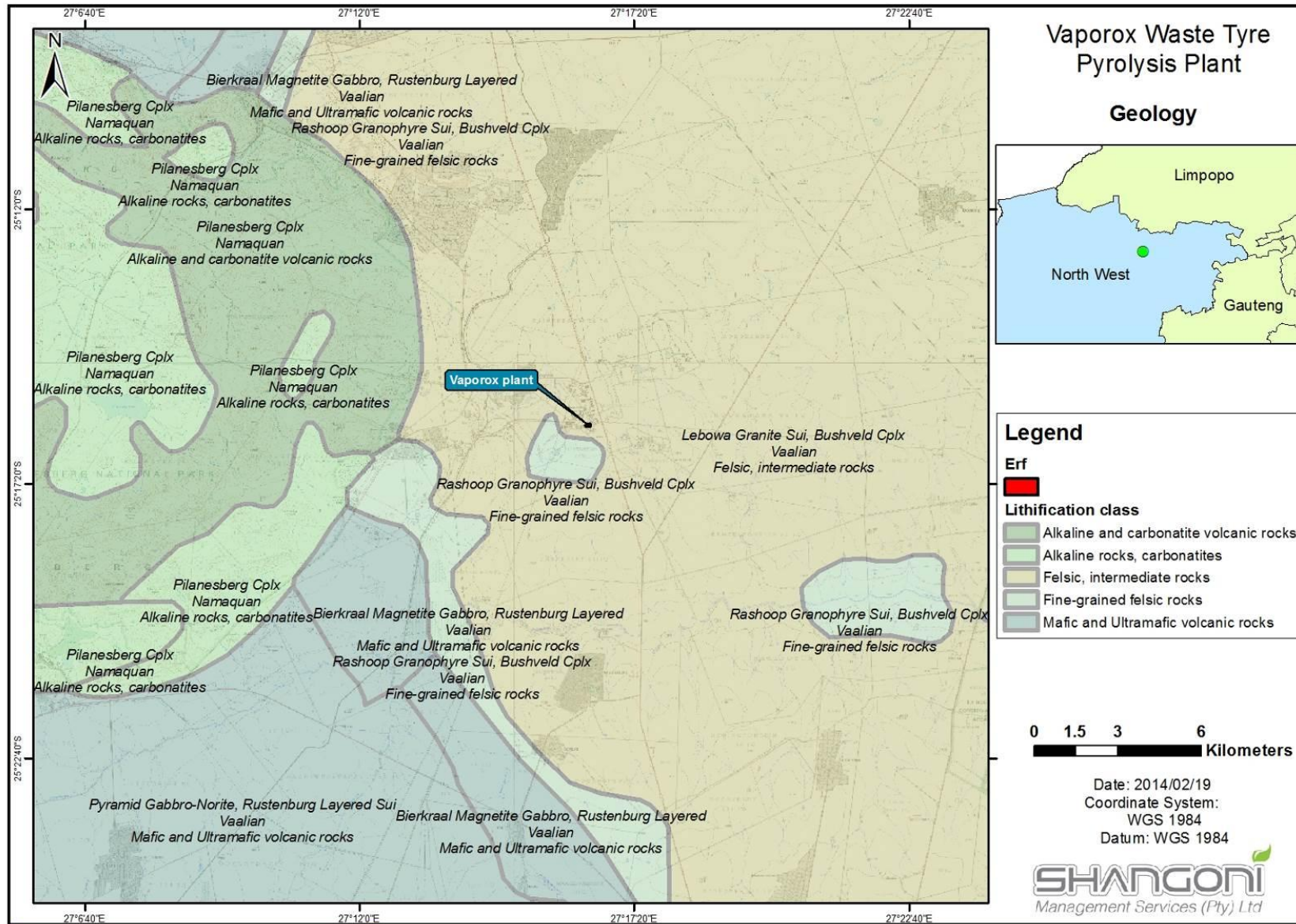


Figure 15: Geology of the site

2.2 Regional climate

2.2.1 Rainfall

The mean annual rainfall at the site area is 401 – 600mm per annum (AGIS, 2007). The figure below shows the annual monthly rainfall at the site for 2012, as compiled from Numerical Weather Prediction (NWP) Meteorological Data (Crown, 2009).

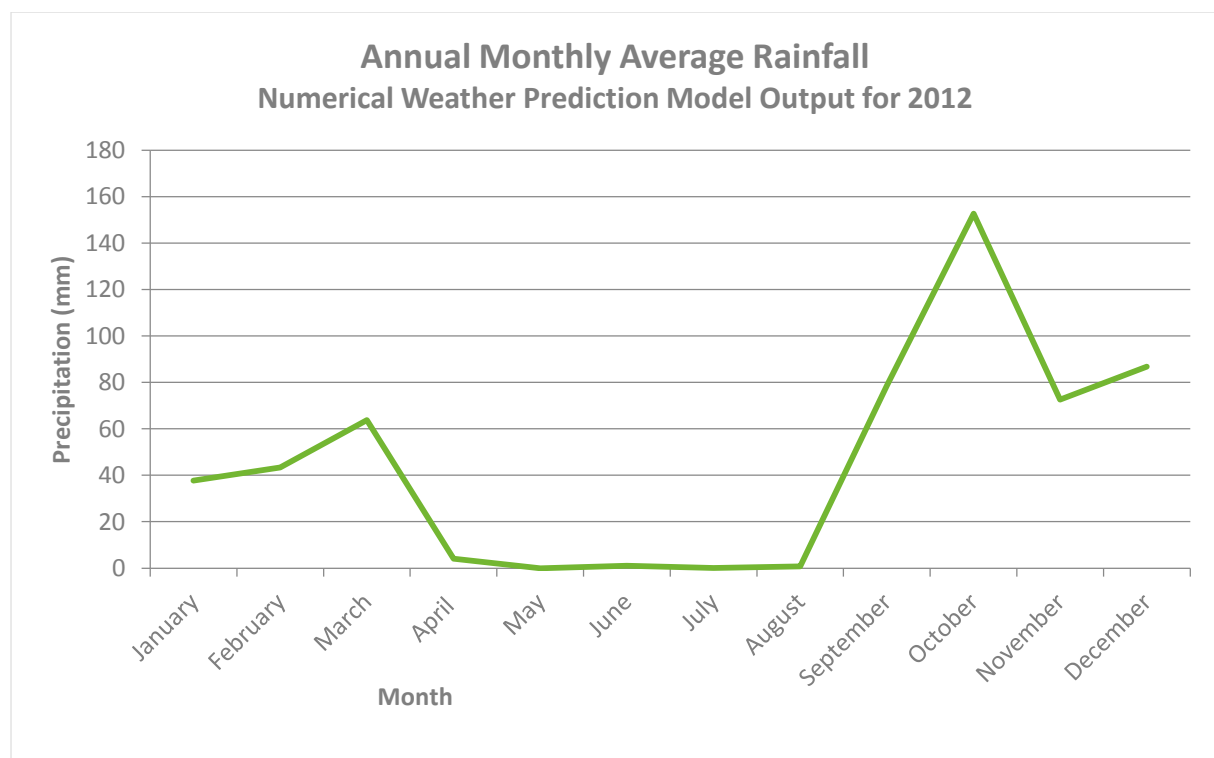


Figure 16: Annual monthly rainfall at the site (Crown, 2009)

2.2.2 Temperature

According to the AGIS Comprehensive Atlas, 2007, the maximum mean annual temperature for the site is between 29.1°C and 31°C and the minimum mean annual temperature for the site area is between 2.1°C and 4°C. The figure below shows the annual monthly average temperature at the site for 2012, as compiled from Numerical Weather Prediction (NWP) Meteorological Data (Crown, 2009).



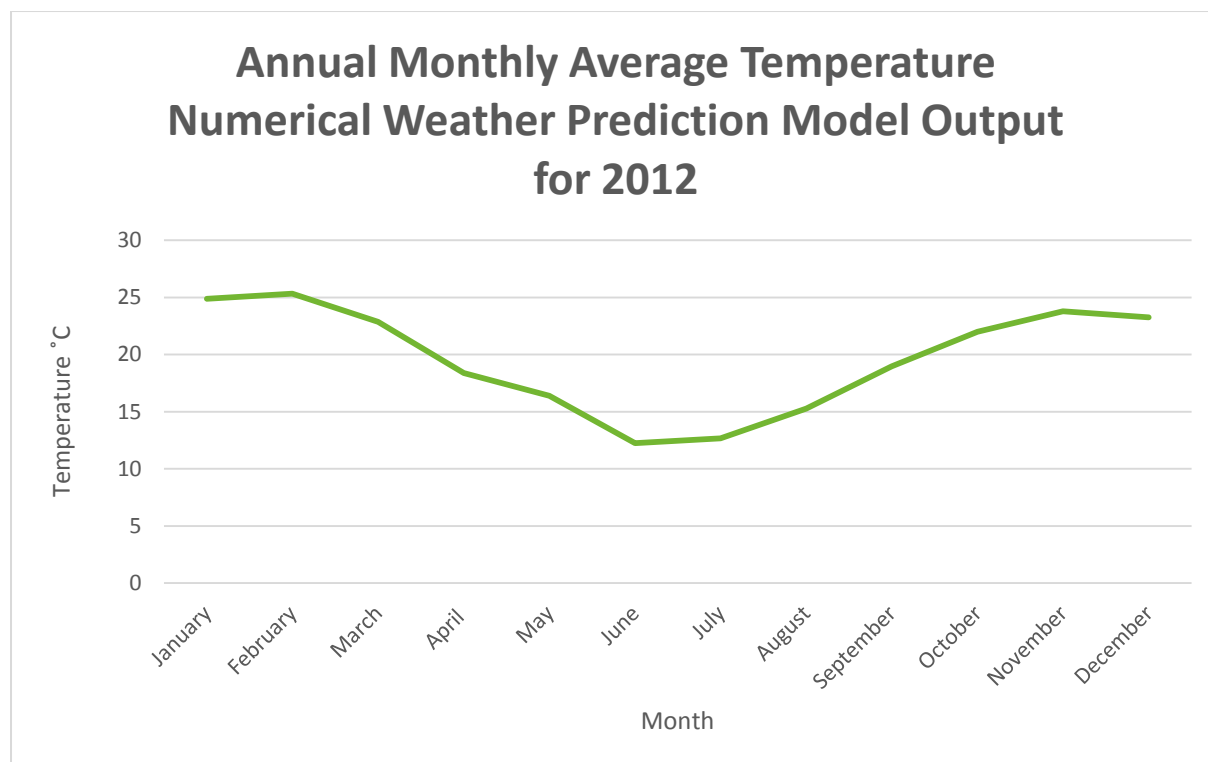


Figure 17: Annual Monthly Average Temperature at the site (Crown, 2009)

2.2.3 Evaporation

The Mean Annual Evaporation of the area is 1 700-1 800mm per annum (DWAF, 2010).

2.2.4 Wind

The figure below shows the annual and seasonal prevailing wind direction at the site for 2012, as compiled from Numerical Weather Prediction (NWP) Meteorological Data (Crown, 2009). The prevailing wind direction at the site is from the South east-east.



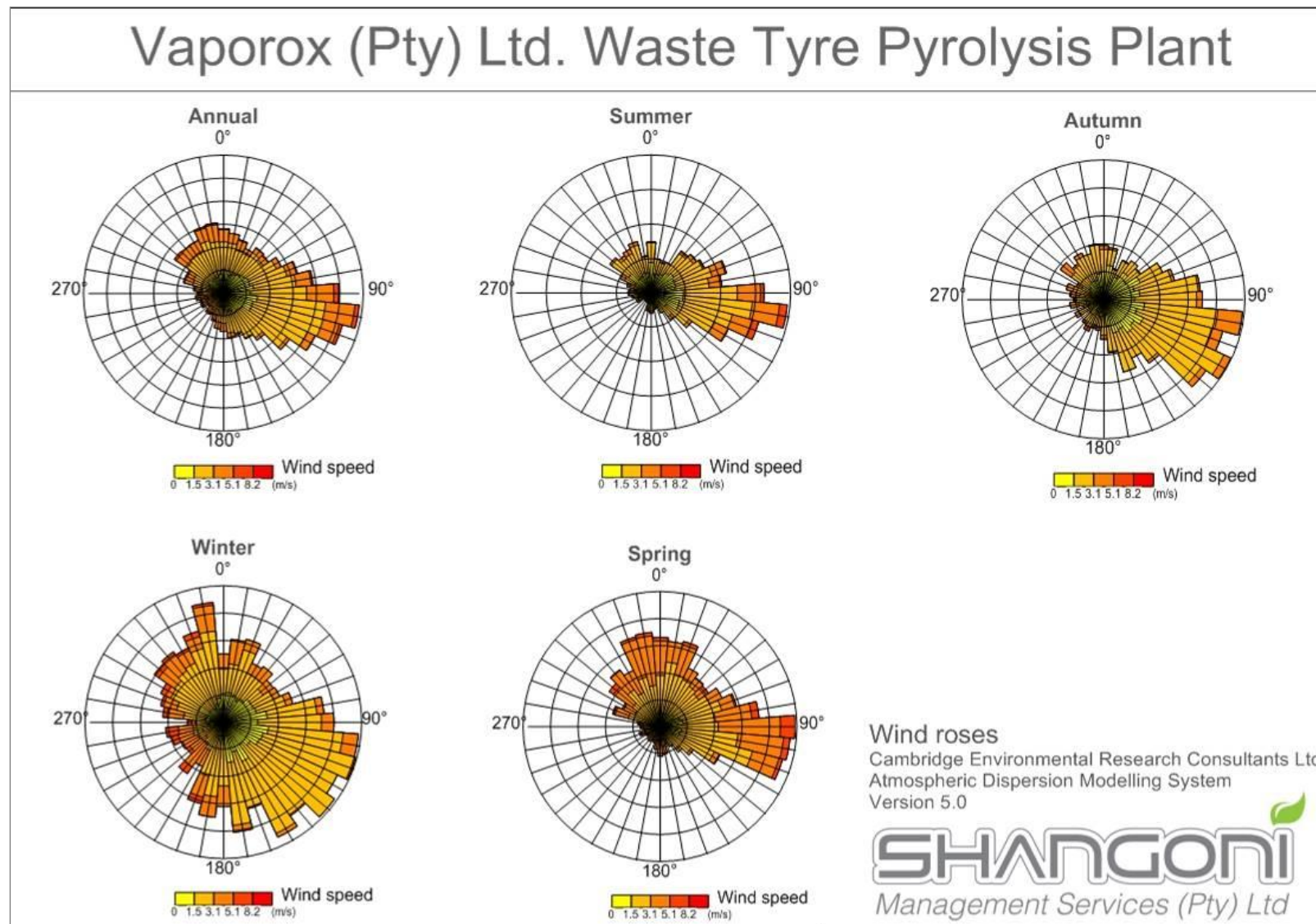


Figure 18: Wind roses showing the prevailing wind direction at the site (Crown, 2009)

2.3 Topography

According to Mucina and Rutherford (2006), areas covered by Central Sandy Bushveld (the vegetation type of the site), are characterised by low, undulating areas that are sometimes found between mountains, as well as catenas and sandy plains (Mucina and Rutherford, 2006). A catena is defined as a group of soils that are found together within a landscape and share the same parent material.

As can be seen in the figure below, the site slopes downwards from the eastern to western part of the site. The elevation is 1 092 metres above sea level (masl) on the eastern boundary of the site and 1 085 metres above sea level on the western boundary of the site. Existing Building 1 is situated at an average elevation of 1088masl, Existing Building 2 is situated at an average elevation of 1088masl and Existing Building 3 is situated at an average elevation of 1087masl. According to the AGIS Comprehensive Atlas (2007), the slope of the site is between 0 and 5%.



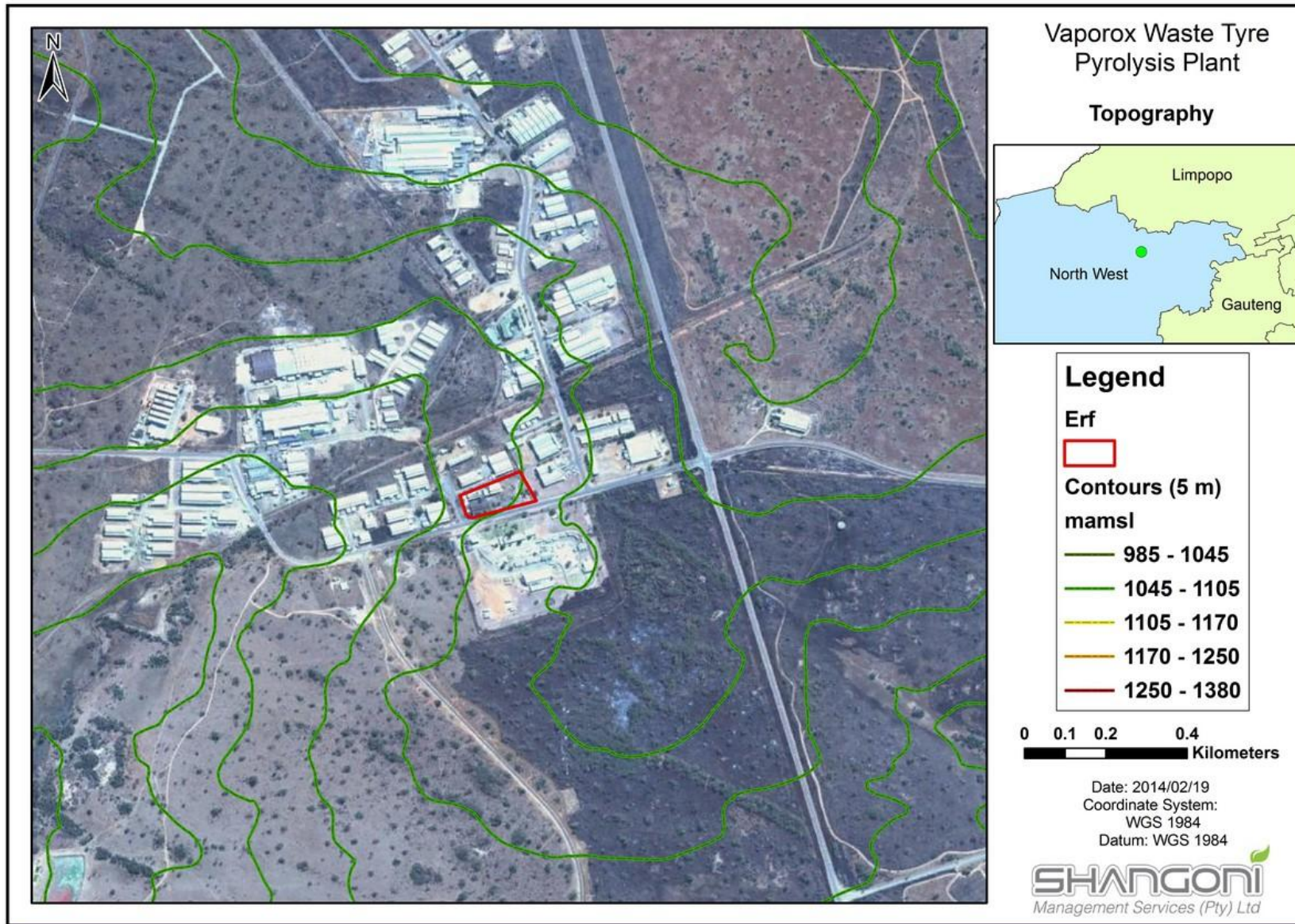


Figure 19: Topography of the site

2.4 Soils

In general, soils underlying Central Sandy Bushveld (the vegetation type of the site), are deep Hutton or Clovelly soils that are well-drained and often have a catenary sequence of Hutton at the top and Clovelly on the lower slopes. Shallow Glenrosa soils may also occur and the main land types are Ac, Ba, Bb, Bd and Fa (Mucina & Rutherford, 2006).

As shown in the figure below, the site is characterised by one soil type, namely S21. S21 soils are an association of Class 13 and 16 soils and are undifferentiated, shallow soils. The soils may receive water runoff from associated rocks (water intake areas) and have restricted land use options. The land type of the site is Fa4 according to the AGIS Comprehensive Atlas (2007). The clay content of this land type varies between 4 and 40% for the A horizon, between 4 and 10% for the E horizon and between 4 and 57% for the B21 horizon (AGIS, 2007).



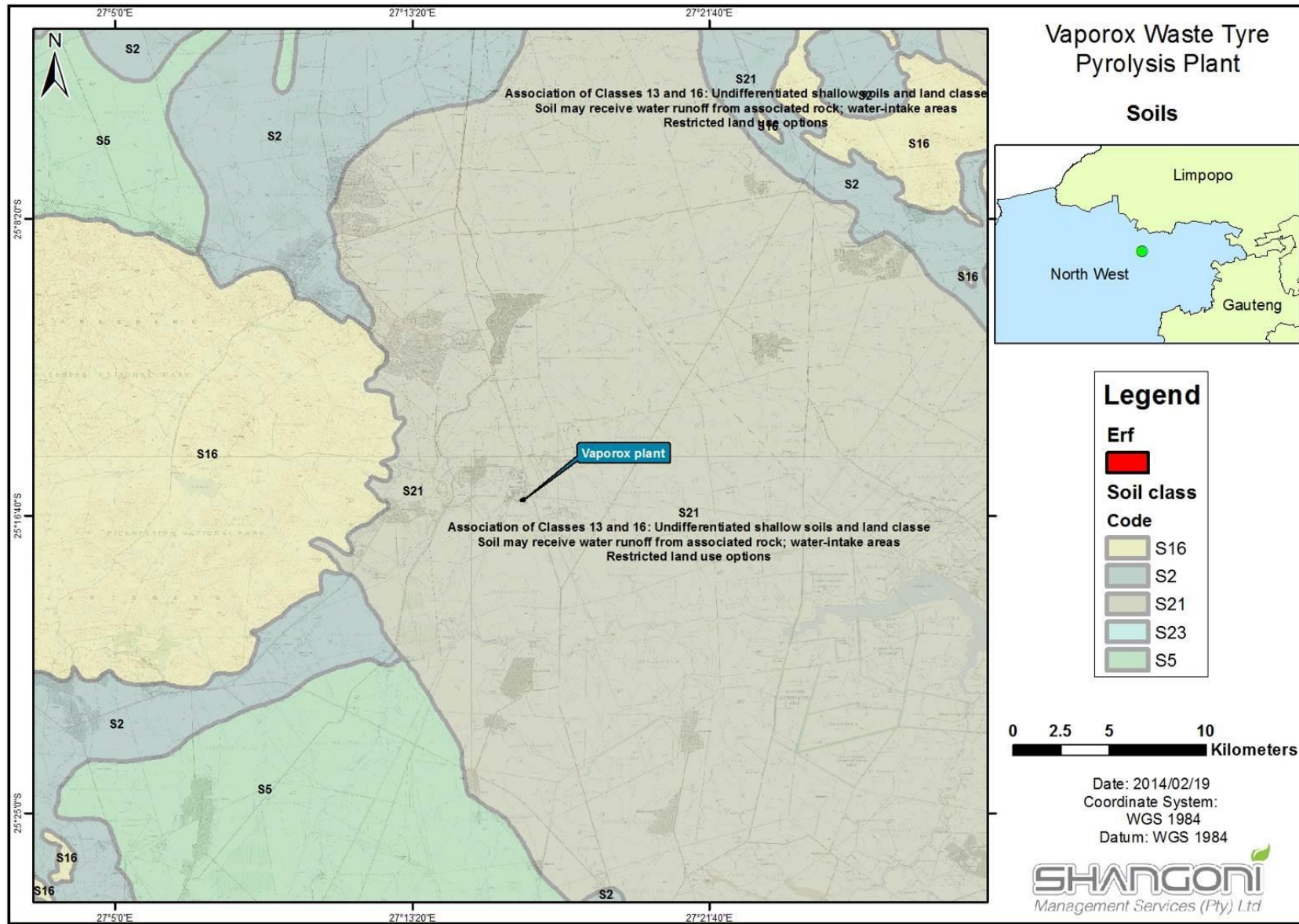


Figure 20: Soil type present at the site

2.5 Land use and land capability

The property is zoned as Industrial land and three existing buildings, erected by the previous owners/tenants are present on the site, together with associated infrastructures such as roads and the entrance gate. The buildings and associated infrastructures cover approximately half of the property and the remaining areas is open land.

According to the AGIS Comprehensive Atlas (2007) the land capability of the property is “Moderate Potential Agricultural Land”. The dominant land use surrounding the property is industrial uses, urban/built-up areas, residential areas, bush veldt and a municipal landfill site. A number of the adjacent properties are also owned by the North West Development Corporation. In the wider area surrounding the site, a number of mines, the Pilanesberg National Park and the Vaalkop Dam Nature Reserve are present.

2.6 Vegetation

As the site was disturbed previously when buildings were constructed, only half of the site has remaining vegetative cover present. Due to the disturbed nature of the vegetation onsite, a desktop assessment was undertaken at this stage to describe the nature of any natural vegetation surrounding the site.

As shown in the figure below, the vegetation type of the area and site is Central Sandy Bushveld (SVcb 12). This bushveld is found at an elevation of between 850 and 1 450 metres above sea level in the Mpumalanga, Limpopo, North-West and Gauteng Provinces. The vegetation type is listed as “Vulnerable” with a conservation target percentage of 19%. Currently, less than 3% of the vegetation type areas are statutorily conserved in a number of nature reserves such as the Skuinsdraai and Doorndraai Dam Nature Reserves. A further 2% is conserved in other reserves, such as private reserves and the Wallmansthal SANDF Property (Mucina & Rutherford, 2006).

2.6.1 Dominant species

Important and biologically important taxa within the Central Sandy Bushveld vegetation type are given in the tables below.

Table 6: Important taxa within the Central Sandy Bushveld (Mucina & Rutherford, 2006)

Taxa	Species
Tall trees	<i>Acacia burkei</i> (d), <i>A. robusta</i> , <i>Sclerocarya birrea</i> subsp. <i>caffra</i>
Small trees	<i>Burkea africana</i> (d), <i>Combretum apiculatum</i> (d), <i>C. zeyheri</i> (d), <i>Terminalia sericea</i> (d), <i>Ochna pulchra</i> , <i>Peltophorum africanum</i> , <i>Rhus leptodictya</i> .
Tall shrubs	<i>Combretum hereroense</i> , <i>Grewia bicolor</i> , <i>G. monticola</i> , <i>Strychnos pungens</i> .
Low shrubs	<i>Agathisanthemum bojeri</i> (d), <i>Indigofera filipes</i> (d), <i>Felicia fascicularis</i> , <i>Gnidia sericocephala</i> .

Taxa	Species
Geoxylic suffrutex	<i>Dichapetalum cymosum</i> (d).
Woody climber	<i>Asparagus buchananii</i> .
Graminoids	<i>Brachiaria nigropedata</i> (d), <i>Eragrostis pallens</i> (d), <i>E. rigidior</i> (d), <i>Hyperthelia dissoluta</i> (d), <i>Panicum maximum</i> (d), <i>Perotis patens</i> (d), <i>Anthephora pubescens</i> , <i>Aristida scabrivalvis</i> subsp. <i>scabrivalvis</i> , <i>Brachiaria serrata</i> , <i>Elionurus muticus</i> , <i>Eragrostis nindensis</i> , <i>Loudetia simplex</i> , <i>Schmidtia pappophoroides</i> , <i>Themeda triandra</i> , <i>Trachypogon spicatus</i> .
Herbs	<i>Dicerocaryum senecioides</i> (d), <i>Barleria macrostegia</i> , <i>Blepharis integrifolia</i> , <i>Crabbea angustifolia</i> , <i>Evolvulus alsinoides</i> , <i>Geigeria burkei</i> , <i>Hermannia lancifolia</i> , <i>Indigofera daleoides</i> , <i>Justicia anagalloides</i> , <i>Kyphocarpa angustifolia</i> , <i>Lophiocarpus tenuissimus</i> , <i>Waltheria indica</i> , <i>Xerophyta humilis</i> .
Geophytic herb	<i>Hypoxis hermerocallidea</i> .
Succulent herb	<i>Aloe greatheadii</i> var <i>davyana</i> .

Table 7: Biogeographically important taxa (Central Bushveld endemics) within the Central Sandy Bushveld (Mucina & Rutherford, 2006)

Taxa	Species
Graminoid	<i>Mosdenia leptostachys</i> .
Herb	<i>Oxygonum dregeanum</i> subsp. <i>canescens</i> var. <i>dissectrum</i> .

2.6.2 Alien invasive species

A number of alien plants are widely scattered at low densities within the Central Sandy Bushveld vegetation type. These alien species include *Cereus jamacaru*, *Eucalyptus* species, *Lantana camara*, *Melia azedarach*, *Opuntia ficus-indica* and *Sesbania punicea*.



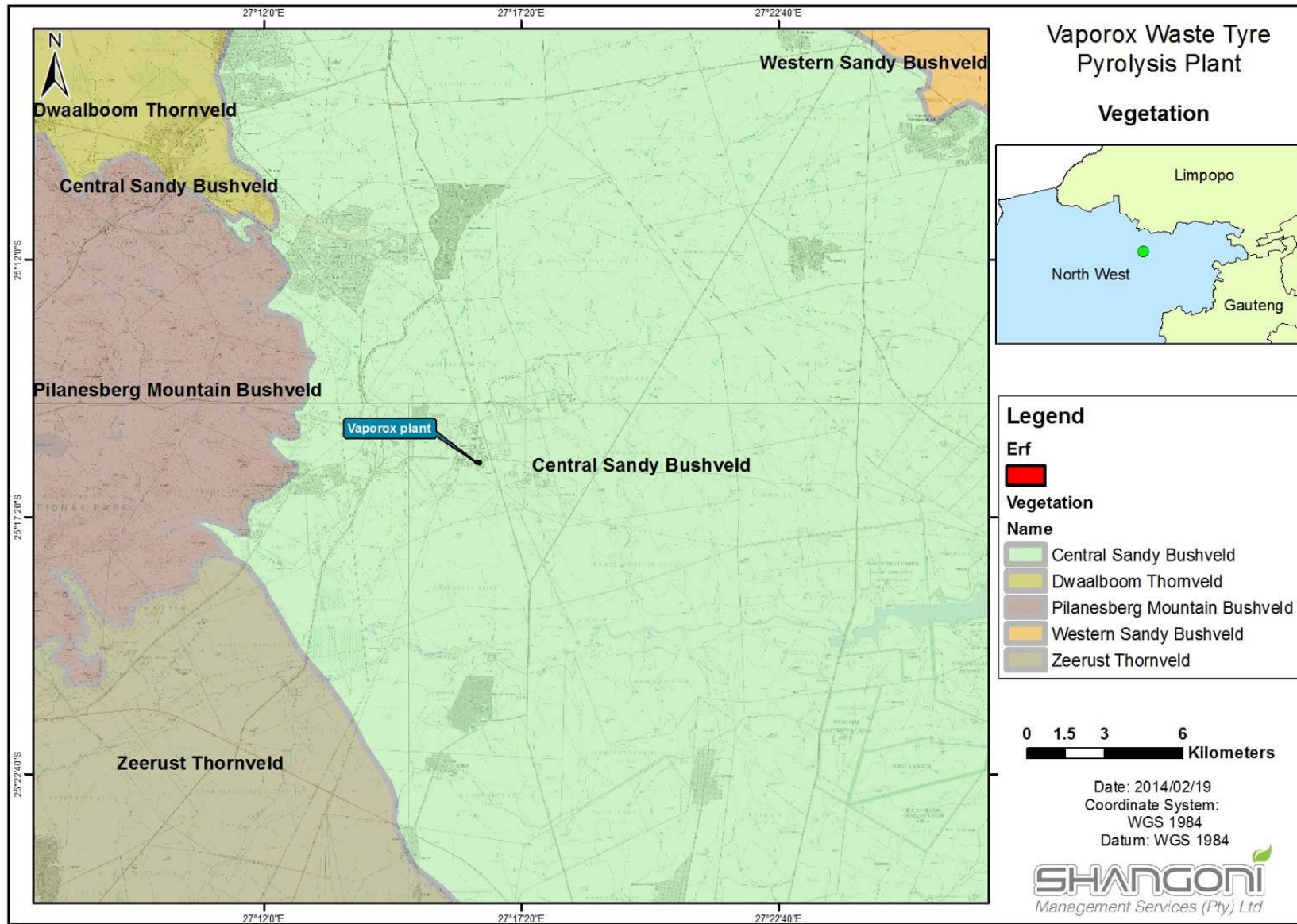


Figure 21: Vegetation type at the site

2.7 Animal life

2.7.1 Commonly occurring species

According to the South African Biodiversity Information Facility (SIBIF), the following animal species commonly occur in the vicinity of the project site.

Table 8: List of commonly occurring insect species in the vicinity of the site (SANBI, 2009)

Scientific name	Common name
<i>Crocisaspidia chandieri</i>	Species of Apidae (bees)
<i>Lipotriches rubella</i>	Species of Apidae (bees)
<i>Amegilla sp.</i>	Species of Blue-banded Bee
<i>Anthophora sp.</i>	Species of Apidae (bees)
<i>Megachile sp.</i>	Species of Leafcutter Bee
<i>Xylocopa caffra</i>	Species of Carpenter Bee

Table 9: List of commonly occurring fish species in the vicinity of the site (SANBI, 2009)

Scientific name	Common name
<i>Oreochromis mossambicus</i>	Mozambique Tilapia
<i>Pseudocrenilabrus philander</i>	Southern Mouthbrooder
<i>Tilapia sparrmanii</i>	Banded Tilapia
<i>Chetia flaviventris</i>	Canary Kurper
<i>Barbus unitaeniatus</i>	Slender Barb
<i>Barbus paludinosus</i>	Straightfin Barb

2.7.2 Endangered species

The following tables show the IUCN (International Union for Conservation of Nature and Nature Resources) Red List of Threatened Species that are found in the North West Province. Importantly, these species are not necessarily present at the specific project site. The following abbreviations are used: EN: Endangered; VU: Vulnerable; NT: Near Threatened; DD: Data Deficient; and LC: least concern.

Table 10: IUCN Red List of threatened mammal species (IUCN, 2013)

Scientific name	Common name	Red List Status
<i>Graphiurus ocellaris</i>	Spectacled Dormouse	LC
<i>Mystromys albicaudatus</i>	White-tailed Mouse	EN
<i>Pronolagus rupestris</i>	Smith's Red Rock Hare	LC

Table 11: IUCN Red List of threatened insect species (IUCN, 2013)

Scientific name	Common name	Red List Status
<i>Anax ephippiger</i>	Vagrant Emperor	LC
<i>Anax imperator</i>	Blue Emperor	LC

Scientific name	Common name	Red List Status
<i>Anax speratus</i>	Orange Emperor	LC
<i>Cacyreus virilis</i>	Alternative Bush Blue	LC
<i>Capys alphaeus</i>	Orange-banded Protea Butterfly	LC
<i>Crocothemis sanguinolenta</i>	Little Scarlet	LC
<i>Diplacodes lefebvreii</i>	Black Percher	LC
<i>Frankenbergerius forcipatus</i>	-	DD
<i>Ischnura senegalensis</i>	Common Bluetail	LC
<i>Orthetrum chrysostigma</i>	Epaulet Skimmer	LC
<i>Lestes pallidus</i>	Pallid Springwing	LC
<i>Nesciothemis farinosa</i>	Black-tailed Skimmer	LC
<i>Orthetrum trinacria</i>	Long Skimmer	LC
<i>Palpopleura deceptor</i>	Deceptive Widow	LC
<i>Pantala flavescens</i>	Globe Skimmer	LC
<i>Paternympha narycia</i>	Spotted-eye Brown	LC
<i>Pseudagrion kersteni</i>	Kersten's Sprite	LC
<i>Rhyothemis semihyalina</i>	Phantom Flutterer	LC
<i>Sympetrum fonscolombii</i>	Red-veined Darter	LC
<i>Tramea basilaris</i>	Keyhole Glider	LC
<i>Trithemis annulata</i>	Violet Dropwing	LC
<i>Trithemis arteriosa</i>	Red-veined Dropwing	LC
<i>Trithemis furva</i>	Navy Dropwing	LC
<i>Trithemis kirbyi</i>	Orange-winged Dropwing	LC
<i>Tuxentius calice</i>	White Pierrot	LC

Table 12: IUCN Red List of threatened reptile species (IUCN, 2013)

Scientific name	Common name	Red List Status
<i>Acontias percivali</i>	Percival's Legless Skink	LC
<i>Chamaeleo dilepis</i>	Common African Flap-necked Chameleon	LC
<i>Lygodactylus nigropunctatus</i>	Black-spotted Dwarf Gecko	LC
<i>Psammophis subtaeniatus</i>	Stripe-bellied Sand Snake	LC

Table 13: IUCN Red List of threatened millipede (Diplopoda) species (IUCN, 2013)

Scientific name	Common name	Red List Status
<i>Doratogonus levigatus</i>	-	LC
<i>Doratogonus rugifrons</i>	-	LC

Table 14: IUCN Red List of threatened snail and slug (Gastropoda) species (IUCN, 2013)

Scientific name	Common name	Red List Status
<i>Biomphalaria pfeifferi</i>	-	LC
<i>Galba truncatula</i>	-	LC



Table 15: IUCN Red List of threatened fish species (IUCN, 2013)

Scientific name	Common name	Red List Status
<i>Barbus brevipinnis</i>	Shortfin Barb	NT
<i>Barbus motebensis</i>	Marico Barb	VU
<i>Barbus rapax</i>	Southern Papermouth	LC
<i>Barbus sp. nov. 'Waterberg'</i>	Waterberg Shortfin Barb	NT
<i>Barbus trimaculatus</i>	Threespot barb (FB)	LC
<i>Chetia flaviventris</i>	Canary Kurper	LC
<i>Chiloglanis pretoriae</i>	Shortspine Suckermouth	LC
<i>Labeo rosae</i>	Rednose Labeo	LC
<i>Labeo umbratus</i>	Moggel	LC
<i>Labeobarbus aeneus</i>	Vaal-orange Smallmouth Yellowfish	LC
<i>Labeobarbus kimberleyensis</i>	Largemouth Yellowfish, Vaal-orange Largemouth Yellowfish	NT
<i>Labeo capensis</i>	Orange River Mudfish	LC

Table 16: IUCN Red List of threatened crustacea (Malacostraca) species (IUCN, 2013)

Scientific name	Common name	Red List Status
<i>Potamonautes calcaratus</i>	-	LC
<i>Potamonautes sidneyi</i>	Sidney's River Crab	LC
<i>Potamonautes unispinus</i>	Single-spined River Crab	LC

The site is situated approximately 220m from a tributary of the Mogwase River.

2.8 Surface water

2.8.1 Catchment areas

The site lies within the A22F quaternary catchment as shown in the figure below. This quaternary catchment region is situated within the Crocodile (West) and Marico Water Management Area. The main rivers within this Water Management Area give rise to the Limpopo River at their confluence (DWAF, 2004).



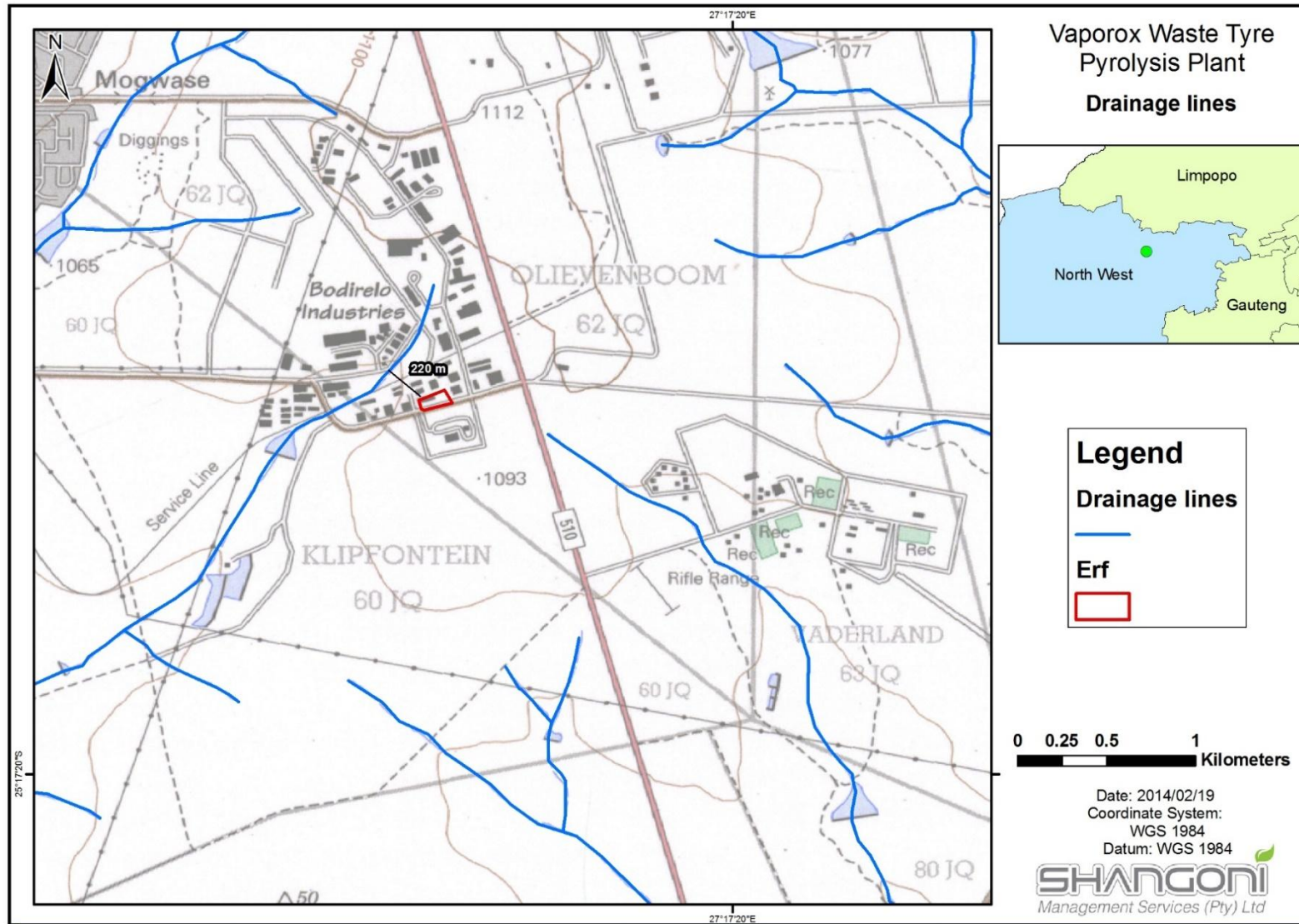


Figure 22: Quaternary catchment within which the site lies together with drainage lines in the immediate vicinity of the site

2.8.2 Mean annual runoff (MAR)

The total Natural Mean Annual Runoff for the Crocodile (West) and Marico Water Management Area is 855 million m³/annum and the Ecological Reserve is 164 million m³/annum (DWAF, 2004).

2.8.3 Surface water quantity and use

No surface water is used or will be used on the property as an existing municipal water supply is present to the site.

2.8.4 Water authority

The relevant water authority is the Department of Water Affairs, Hartebeespoort Regional office.

2.9 Groundwater

2.9.1 Aquifer type

The aquifer type of the area is d3, intergranular and fractured aquifers with median borehole yields of 0.5-2 litres/second (Geohydrological Map Sheet 2526, 1999). The aquifers are classified as “minor” aquifers (DWA, 2012).

The groundwater recharge is approximately 4mm per annum and the baseflow is approximately 2mm per annum in the area of the site (DWAF, 2010).

2.9.2 Depth of water tables

The depth to the water level is approximately 19mbgl (metres below ground level) in the area of the site (DWAF, 2010).

2.9.3 Groundwater Use

No groundwater is or will be used on the property as an existing municipal water supply is present to the site.

2.9.4 Groundwater quality

The groundwater quality, in terms of mean TDS (total dissolved solids), underlying the area of the site is 418mg/ℓ (DWAF, 2010).

2.10 Sensitive landscapes

As shown in the figure below, there are no sensitive areas on the proposed site itself. Sensitive areas include for example, wetlands and Critical Biodiversity Areas (CBAs) as determined in Provincial Biodiversity Conservation Plans. According to the Biodiversity Conservation Plan for the North-west



Province, areas surrounding the proposed site have been designated as Biodiversity Conservation Areas, Terrestrial CBA Category 1 and 2 (shown in green on the figure below). The site is situated 4.4km to the south-east of the Pilanesberg National Park.

According to the South African Biodiversity Institutes Biodiversity GIS database, no wetlands are present on the site (SANBI, 2004).



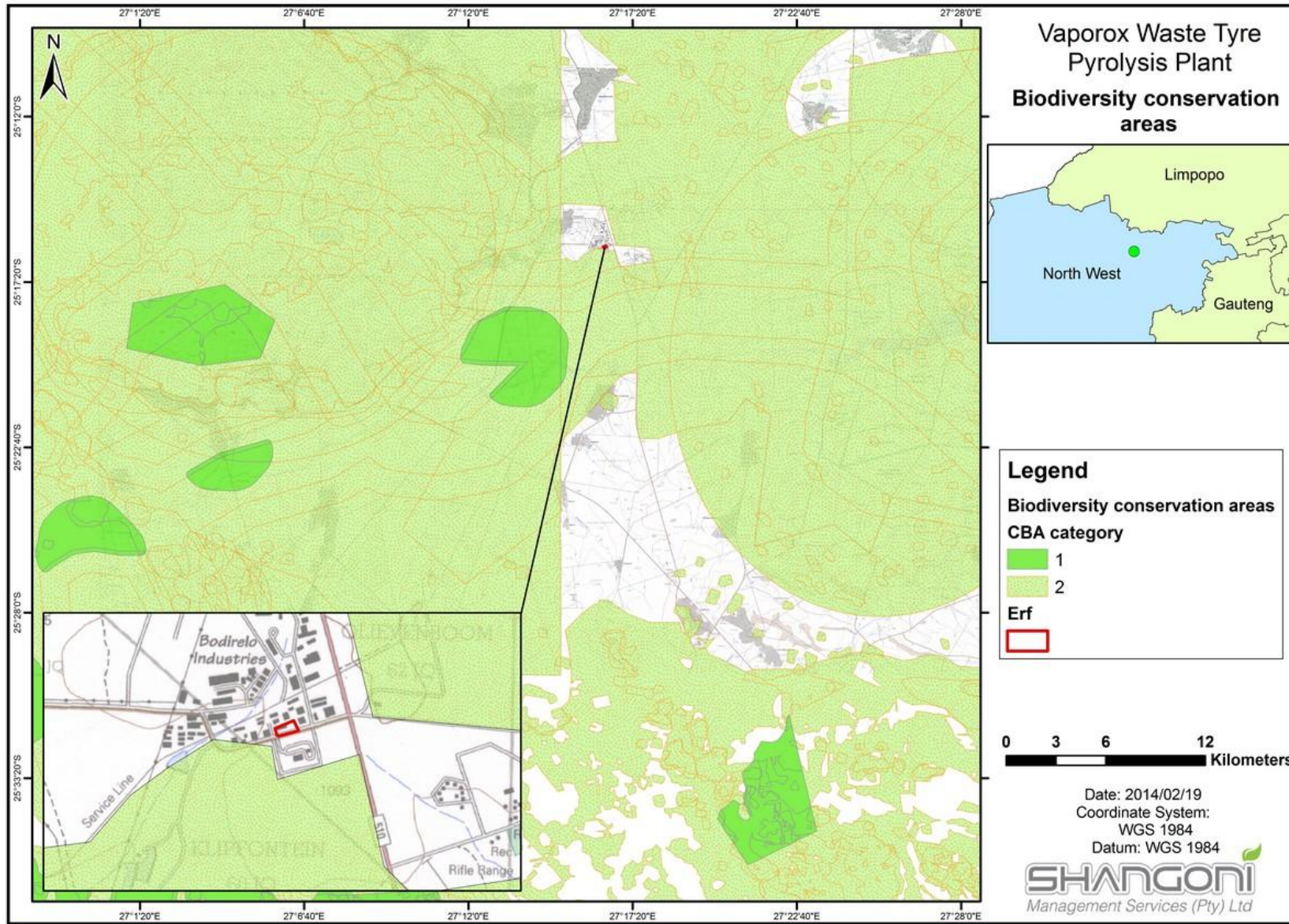


Figure 23: Sensitive areas in the vicinity of the site

2.11 Sites of archaeological and cultural interest

Approximately half of the site has been disturbed in the past by previous owners during the construction of three buildings and associated infrastructures. No information is available relating to the possible presence or absence of any sites of cultural heritage (historical and/or archaeological). The South African Heritage Resources Agency has been informed of the proposed development and Shangani is awaiting feedback from them as to whether a Heritage Impact Assessment is required as part of this Basic Environmental Impact Assessment process.

2.12 Air Quality

2.12.1 Background Ambient Air Quality of the Area

According to the South African National Framework for Air Quality Management, the Waterberg District potentially has poor air quality, mainly due to emissions from industries. Industries in the Waterberg District are mainly small to medium-sized industries and include brickworks, dairy product-, meat- and oil- processing plants and the manufacturing of animal feeds. Other main activities in the area are agriculture, forestry, game farming and eco-tourism. Additional proposed industrial developments will make the Waterberg District an important role player in terms of air quality in the near future.

The Waterberg-Bojanala area has been declared a National Air Shed Priority Area in Government Notice No. 495 of 2012 (amended by Government Notice No. 154 of 8 March 2013). The Bojanala Platinum District consists of a number of atmospheric pollution sources, such as a power station, many open-cast mining operations, heavy and light industries, a refinery, motor vehicles as well as houses where coal is used for domestic heat generation (DEA, 2014).

Once an airshed area has been declared a priority area, an Air Quality Management Plan must be developed for that area. The following are proposed emission reduction strategies for small industries within the Waterberg district:

- The electronic database of all small industries developed as part of the AQMP should be updated by the District Municipality in conjunction with the Limpopo Province;
- Periodic site inspections and emissions measurements should be undertaken by the District Municipality;
- DEAT should develop a permit system for all non-listed activities;
- The District Municipality should model scheduled trade by-laws;
- As part of the current standards setting process, standards for small boilers will be proposed; and
- The Waterberg District Municipality should review these standards for possible inclusion into the Municipal by-laws.



An Atmospheric Emission Licence application will be submitted to the Bojanala Platinum District Municipality for proposed activities at the pyrolysis plant that require licensing in terms of Government Notice No. 893 of 22 November 2013.

2.13 Visual aspects

The proposed site is situated on the corner of a road crossing (Ramokoka Drive and an unnamed road) and is clearly visible to passing motorists on both roads. The site is also visible from neighbouring properties on all sides. The surrounding land uses are also industrial and the area is zoned as Industrial land. Most of the buildings in the area therefore have an industrial appearance.

2.14 Socio-economic aspects

The site is situated within the Moses Kotane Local Municipality, Bojanala Platinum District Municipality, North West Province.

2.14.1 Demography

According to the 2011 census, 242 554 people formed part of the 75 193 households in the Moses Kotane Local Municipality. The average household size is 3.2 people per household. The growth rate in the municipality is 0.22% per annum. There are 98.8 men for every 100 women (Statistics South Africa, 2011) in the municipality and the table below shows the age structure of the municipality.

Table 17: Moses Kotane Local Municipality age structure -Census 2011 (Statistics South Africa, 2011)

Age Group	Percentage of population (%)
Under 15 years of age	29.2
15 to 64 years of age	63.1
Over 65 years of age	7.7
Total	100

2.14.2 Major economic activities

The economy of the region is mostly dominated by the mining industry. This industry contributes 42% of the GDP (Gross Domestic Product) and 39% of employment opportunities in the province. The second largest industry is the agricultural industry that contributes 13% of the GDP and 18% of the employment opportunities in the province. The tourism industry is also very important in the province (Moses Kotane Local Municipality, 2013/2014) and the Pilanesberg National Park is situated approximately 6,3km to the west of the proposed site.



2.14.3 Unemployment and employment

The 2011 census found that the official unemployment rate was 37.9% and the youth unemployment rate (15 to 34 years of age) was 47.4%. The dependency ratio was 58.6 per 100 people between the ages of 15 and 64 years (Statistics South Africa, 2011).



3. APPLICABLE LEGISLATION AND GUIDELINES

The table below provides an indication of the main legislation, policies and/or guidelines applicable to the proposed project.

Table 18: Applicable legislation, policies and/or guidelines

Title of legislation, policy or guideline	Administering authority	Aim of legislation, policy or guideline
Laws of General Application		
The Constitution of the Republic of South Africa, 1996 (Act No. 108 of 1996)	-	To establish a Constitution with a Bill of Rights for the RSA.
Environment Conservation Act, 1989 (Act No. 73 of 1989, as amended)	North West Department of Rural, Environmental and Agricultural Development	To control environmental conservation.
National Environmental Management Act, 1998 (Act No. 107 of 1998). National Environmental Management Amendment Act, 2008 (Act No. 62 of 2008).	North West Department of Rural, Environmental and Agricultural Development	To provide for the integrated management of the environment, and to regulate the 'Duty of Care' Principle.
Promotion of Access to Information Act, 2000 (Act No. 2 of 2000, as amended)	-	To give effect to the constitutional right of access to any information held by the State and any information that is held by another person and that is required for the exercise or protection of any rights.
Air Quality and Noise		
National Environmental Management: Air Quality Act (Act No. 39 of 2004)	Bojanala Platinum District Municipality	To reform the law regulating air quality to protect the environment by providing reasonable measures for the prevention of pollution. To provide for national norms and standards regulating air quality monitoring, management and control.
Environmental Conservation Act, 1989, Noise Control Regulations in terms of Section 25 of the Environmental Conservation Act, 1989 (Act No. 73 of 1989)	Bojanala Platinum District Municipality	To regulate the generation of noise and its impact on the environment.
Water Management		
National Water Act (NWA), 1998 (Act No. 36 of 1998)	Department of Water Affairs	To provide for fundamental reform of the law relating to water resources.
Waste Management		



Title of legislation, policy or guideline	Administering authority	Aim of legislation, policy or guideline
National Environmental Management: Waste Act (Act No. 59 of 2008)	North West Department of Rural, Environmental and Agricultural Development	To reform the law regulating waste management in order to protect health and the environment by providing reasonable measures for the prevention of pollution and ecological degradation.
Government Notice (GN) 921: “List of waste management activities that have, or are likely to have a detrimental effect on the environment”, dated 2013.	North West Department of Rural, Environmental and Agricultural Development	To regulate and control the authorisation of certain waste-related listed activities.
GNR. 926 of 29 November 2013 – National Norms and Standards for the Storage of Waste	North West Department of Rural, Environmental and Agricultural Development	To provide a uniform national approach to the management of waste storage facilities, to ensure best practice in the management of waste storage facilities and to provide minimum standards for the design and operation of new and existing waste storage facilities.
GNR. 634 of 23 August 2013 – Waste Classification and Management Regulations	North West Department of Rural, Environmental and Agricultural Development	To regulate the classification and management of waste in a manner that supports and implements the provisions of the Waste Act, to establish a mechanism and procedure for the listing of waste management activities that do not require a Waste Management Licence, to prescribe requirements for the disposal of waste to landfill, to prescribe requirements and timeframes for the management of certain wastes and to prescribe general duties of waste generators, transporters and managers.
Environmental Conservation Act, 1989, Waste Tyre Regulations, 2008.	North West Department of Rural, Environmental and Agricultural Development	To regulate the management of waste tyres by providing for the regulatory mechanisms.
Integrated Industry Waste Tyre Management Plan of the Recycling and Economic Development Initiative of South Africa (REDISA)	National Department of Environmental Affairs	To support and promote tyre recycling, providing the collection and depot infrastructure required to collect waste tyres from across the entire country and deliver them to approved recyclers.
Biodiversity		
National Environmental Management Biodiversity Act, 2004 (Act No. 10 of	North West Department of Rural, Environmental and	To provide for the management and conservation of South Africa’s



Title of legislation, policy or guideline	Administering authority	Aim of legislation, policy or guideline
2004)	Agricultural Development	biodiversity within the framework of the National Environmental Management Act, 1998.
Conservation of Agricultural Resources Act, 1983 (Act No. 43 of 1983)	North West Department of Rural, Environmental and Agricultural Development	To provide for control over the utilisation of the natural agricultural resources of South Africa in order to promote the conservation of the soil, the water sources and the vegetation and the combating of weeds and invader plants.
National Veld and Forest Fire Act, 1998 (Act No. 101 of 1998)	North West Department of Rural, Environmental and Agricultural Development	To reform the law on veldt and forest fires.
Agricultural Pest Act, 1983 (Act No. 36 of 1983, as amended) – GN R276 of 5 March 2004	North West Department of Rural, Environmental and Agricultural Development	To regulate plants, plant products and other regulated articles when imported into South Africa.
Soil and Land Management		
National Environmental Management Act, 1998 (Act No. 107 of 1998). National Environmental Management Amendment Act, 2008 (Act No. 62 of 2008).	North West Department of Rural, Environmental and Agricultural Development	To provide for the integrated management of the environment and to regulate the 'Duty of Care' Principle.
Environment Conservation Act, 1989 (Act No. 73 of 1989, as amended)	North West Department of Rural, Environmental and Agricultural Development	To control environmental conservation.
Heritage and Archaeological Resources		
National Heritage Resources Act No 25 of 1999 (Act No. 25 of 1999, as amended)	South African Heritage Resources Agency	To introduce an integrated and interactive system for the management of the national heritage resources; to promote good government at all levels, and empower civil society to nurture and conserve their heritage resources so that they may be bequeathed to future generations.
Protected Areas		
National Environmental Management: Protected Areas Act, 2003 (Act No. 57 of 2003, as amended)	North West Department of Rural, Environmental and Agricultural Development	To provide for the protection and conservation of ecologically viable areas representative of South Africa's biological diversity and its natural landscapes.
Planning of New Activities		
National Environmental Management	North West Department of	To provide for the integrated



Title of legislation, policy or guideline	Administering authority	Aim of legislation, policy or guideline
Act, 1998 (Act No. 107 of 1998). National Environmental Management Amendment Act, 2008 (Act No. 62 of 2008).	Rural, Environmental and Agricultural Development	management of the environment and to regulate the 'Duty of Care' Principle.
Government Notice (GN) 921: "List of waste management activities that have, or are likely to have a detrimental effect on the environment", dated 2013.	North West Department of Rural, Environmental and Agricultural Development	To regulate and control the authorisation of certain waste-related listed activities.
Municipal By-laws		
Moses Kotane Local Municipality Water and Sanitation By-laws (LA 249, 20 June 2008)	Moses Kotane Local Municipality	To regulate water and sanitation related matters within the local municipal area.
Moses Kotane Local Municipality Solid Waste By-law 2013	Moses Kotane Local Municipality	To regulate the management of solid waste within the local municipal area.



4. PUBLIC PARTICIPATION PROCESS

4.1 Objectives of the Public Participation Process (PPP)

Section 24 of the Constitution of the Republic of South Africa of 1996 guarantees everyone the right to an environment that is not harmful to their health and well-being and to have the environment protected for the benefit of present and future generations. In order to give effect to this right, the National Environmental Management Amendment Act (NEMA), 2008 came into effect.

In terms of Section 24 (4) of the NEMA, 2008, procedures for the investigation, assessment and communication of the potential consequences or impacts of activities on the environment must, *inter alia*, ensure, with respect to every application:

- Coordination and cooperation between organs of state in the consideration of assessments where an activity falls under the jurisdiction of more than one organ of state.
- That the findings and recommendations flowing from an investigation, the general objective of integrated management laid down in NEMA, 2008 and the principles of environmental management set out in Section 2 of NEMA, 2008 are taken into account in any decision made by the organ state in relation to any proposed policy, programme, process, plan or projects, consequences or impacts.
- Public information and participation procedures which provide all integrated and affected parties, including all organs of state in all spheres of government that may have jurisdiction over any aspect of the activity, with a reasonable opportunity to participate in those information and participation procedures.

One of the general objectives of integrated environmental management laid down in Section 23(2) (d) of NEMA, 2008 is to: “ensure adequate and appropriate opportunity for public participation in decisions that may affect the environment.”

The National Environmental Management Principles as stipulated in NEMA, 2008 say;

- “Environmental management must place people and their needs at the forefront of its concern, and serve their physical, psychological, developmental, cultural and social interests equitably.
- The participation of all interested and affected parties in environmental governance must be promoted, and all people must have an opportunity to develop the understanding, skills and capacity necessary to achieve equitable and effective participation, and participation by vulnerable and disadvantaged persons must be ensured”.



4.2 Legislation and guidelines followed for the PPP

The public participation process for this project was conducted by Shangoni Management Services in terms of:

- The stipulations in terms of the National Environmental Management: Waste Act, 2008;
- The procedures and provisions in terms of the NEMA (as amended), 2008;
- Chapter 6 of the EIA Regulations of 2010;
- GN 807; Public Participation Guideline in the Environmental Impact Assessment Process, dated October 2012; and
- Other relevant legislation such as the Promotion of Access to Information Act (PAIA), 2000.

Refer to Appendix E for an extract regarding the required public participation process to be followed, taken from the relevant legislation and guidelines

4.3 Public Participation Process followed

4.3.1 Identification and registration of I&APs and key stakeholders

The table below lists adjacent landowners that were identified and notified (by means of e-mail and/or registered post) of the proposed project. Copies of the notifications to the I&APs have been included in Appendix E.

Table 19: List of adjacent landowners identified and notified

Company Name	Contact Person
North West Development Corporation (Pty) Ltd	Mrs Tebogo Kesiamang
Mvelatrans (Pty) Ltd t/a Bojanala Bus Services	Mr Albert Snyders
New Era Recycling (Part of the New Era Group)	Mr Danie Van Rooyen
Durab Manufacturing	Mr Anton Jonker
Four Tops Engineering Service CC	Mr Essau Motloung

All organs of state that may have jurisdiction in respect of the proposed project are considered to be registered I&APs.

The following organs of state were notified of the proposed project:

- Moses Kotane Local Municipality;
- Bojanala Platinum District Municipality;
- North West Department of Agriculture and Rural Development (now North West Department of Rural, Environmental and Agricultural Development);
- North West Department of Finance;
- North West Department of Local Government and Traditional Affairs;
- North West Department of Human Settlements, Public Safety and Liaison;



- North West Department of Public Works, Roads and Transport;
- North West Department of Social Development;
- North West Department of Health;
- Department of Water Affairs;
- South African Heritage Resources Agency;
- Pilanesberg National Park; and
- Vaalkop Dam Nature Reserve.

Copies of the notifications to the organs of state have been included in Appendix E and examples are included in the following pages.

4.3.2 Methods of notification

4.3.2.1 Advertisement(s)

The proposed project was advertised in two local newspapers, the Beeld and the Rustenburg Herald, on the 21st of February 2014. These newspapers were found to be the most appropriate newspapers in terms of their accessibility to I&APs in the vicinity of the proposed site. A copy of the advertisements and proof of their placement is attached in Appendix E and is also given in the figures below.



Figure 24: Proof of placement of the newspaper advertisement in the Beeld newspaper



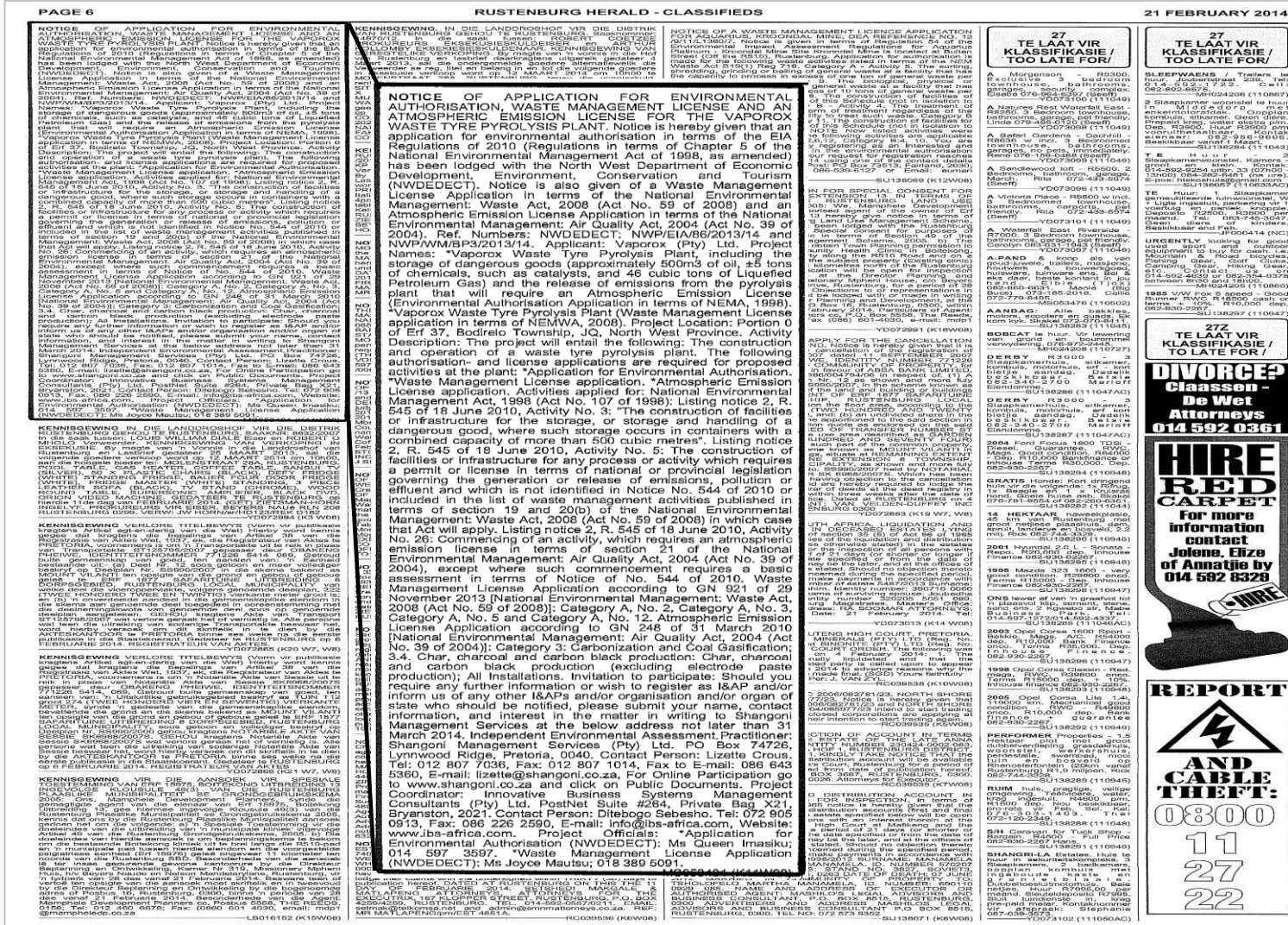


Figure 25: Proof of placement of the newspaper advertisement in the Rustenburg Herald newspaper

4.3.2.2 Placement of site- and public notices

Notice was also given to Interested and Affected Parties (I&APs) by the placement of notice boards. Notice boards were placed at noticeable and conspicuous places. A copy of the site notice and photographs of the site notices are attached in Appendix E and are also given in the figures below.



Figure 26: Site notice 1 at the entrance gate to the proposed site



Figure 27: Site notice 2 on the perimeter fence of the proposed site





VAPOROX (PTY) LTD.	VAPOROX (PTY) LTD.
<p>PUBLIC NOTICE OF APPLICATION FOR ENVIRONMENTAL AUTHORISATION, WASTE MANAGEMENT LICENSE AND AN ATMOSPHERIC EMISSION LICENSE</p>	<p>PUBLIEKE KENNISGEWING TER AANSOEK VIR OMGEWINGSMAGTIGING, AFVALBESTUURSLISENSIE EN 'N ATMOSFERIESE LISENSIE</p>
<p>Notice is hereby given that an application for environmental authorisation in terms of the EIA Regulations of 2010 (Regulations in terms of Chapter 5 of the National Environmental Management Act of 1998, as amended) has been lodged with the North West Department of Economic Development, Environment, Conservation and Tourism (NWDEDECT). Notice is also given of a Waste Management License Application in terms of the National Environmental Management: Waste Act, 2008 (Act No. 59 of 2008) and an Atmospheric Emission License Application in terms of the National Environmental Management: Air Quality Act, 2004 (Act No. 39 of 2004).</p>	<p>Neem kennis dat 'n aansoek om omgewingsmagtiging in terme van die OIS Regulasies van 2010 (Regulasies in terme van Hoofstuk 5 van die Wet op Nasionale Omgewingsbestuur van 1998, soos gewysig) ingedien is by die Noordwes Departement van Ekonomiese Ontwikkeling, Omgewing, Bewaring en Toerisme. Neem ook hiermee kennis van 'n Afvalbestuurslisenis Aansoek in terme van die Wet op Nasionale Omgewingsbestuur: Afval Wet, 2008 (Wet Nr. 59 van 2008) en 'n Atmosferiese Emissie Lisenis Aansoek in terme van die Wet op Nasionale Omgewingsbestuur: Lug Kwaliteit Wet, 2004 (Wet Nr. 39 van 2004).</p>
<p>Reference Numbers: NWDEDECT: NWP/EIA/88/2013 and NWP/WMBP3/2013/14.</p>	<p>Verwysingsnommers: NWDEDECT: NWP/EIA/88/2013 and NWP/WMBP3/2013/14.</p>
<p>Applicant: Vaporox (Pty) Ltd.</p>	<p>Applikant: Vaporox (Pty) Ltd.</p>
<p>Project Names:</p>	<p>Projek Name:</p>
<ul style="list-style-type: none"> Vaporox Waste Tyre Pyrolysis Plant, including the storage of dangerous goods (approximately 500m³ of oil, ±5 tons of chemicals, such as catalysts, and 46 cubic tons of Liquefied Petroleum Gas) and the release of emissions from the pyrolysis plant that will require an Atmospheric Emission License (Environmental Authorisation Application in terms of NEMA, 1998) Vaporox Waste Tyre Pyrolysis Plant (Waste Management License application in terms of NEMWA, 2008) 	<ul style="list-style-type: none"> Vaporox Piroliise Aanleg vir gebruikte bande, insluitend die berging van gevaarlike goedere (ongeveer 500m³ olie, ±5 ton chemikalieë, soos katalisators, en 46 kubieke ton Vloeibare Petroleum Gas) en die vrystelling van emissies van die piroliise-aanleg wat 'n atmosferiese emissie lisenis benodig (Aansoek om Omgewingsmagtiging in terme van die Wet op Nasionale Omgewingsbestuur, 1998) Vaporox Piroliise Aanleg vir gebruikte bande (Afvalbestuurslisenis Aansoek in terme van die Wet op Nasionale Omgewingsbestuur: Afval Wet, 2008)
<p>Project Location: Portion 0 of Erf 37, Bodirelo Township, JQ, North West Province.</p>	<p>Ligging: Gedeelte 0 van Erf 37, Bodirelo Dorpsgebied, JQ, Noordwes Provinsie.</p>
<p>Activity Description: The project will entail the following: The construction and operation of a waste tyre pyrolysis plant. The following authorisation and license applications are required for proposed activities at the plant:</p> <ul style="list-style-type: none"> Application for Environmental Authorisation Waste Management License application Atmospheric Emission License application 	<p>Beskrywing van aktiwiteit: Die projek behels die volgende: Die konstruksie en operasie van 'n afval-band piroliise aanleg. Die volgende magtiging- en lisenis aansoeke word benodig vir voorgestelde aktiwiteite by die aanleg:</p> <ul style="list-style-type: none"> Aansoek om Omgewingsmagtiging Afvalbestuurslisenis Aansoek Atmosferiese Lisenis Aansoek
<p>Legislation:</p>	<p>Wetgewing:</p>
<p>National Environmental Management Act, 1998 (Act No. 107 of 1998): Listing notice 2, R. 545 of 18 June 2010, Activity No. 3: The construction of facilities or infrastructure for the storage, or storage and handling of a dangerous good, where such storage occurs in containers with a combined capacity of more than 500 cubic metres.</p>	<p>Wet op Nasionale Omgewingsbestuur, 1998 (Wet Nr 107 van 1998): Lyskennisgewing 2, R. 545 van 18 Junie 2010, Aktiwiteit Nr 3: Die konstruksie van fasiliteite of infrastruktuur vir die berging, of berging en hantering van gevaarlike goedere, waar sodanige berging plaasvind in houers met 'n gekombineerde kapasiteit van meer as 500 kubieke meter.</p>
<p>Listing notice 2, R. 545 of 18 June 2010, Activity No. 5: The construction of facilities or infrastructure for any process or activity which requires a permit or license in terms of national or provincial legislation governing the generation or release of emissions, pollution or effluent and which is not identified in Notice No. 544 of 2010 or included in the list of waste management activities published in terms of section 19 and 20(b) of the National Environmental Management: Waste Act, 2008 (Act No. 59 of 2008) in which case that Act will apply.</p>	<p>Lyskennisgewing 2, R. 545 van 18 Junie 2010, Aktiwiteit Nr 5: Die konstruksie van fasiliteite of infrastruktuur vir enige proses of aktiwiteit wat vereis dat 'n permit of lisenis in terme van nasionale of provinsiale wetgewing wat die generering of vrystelling van uitlaat, besoedeling of uitvloeiende behouer en wat nie geïdentifiseer is in Kennisgewing Nr. 544 van 2010 of ingesluit is in die lys van afvalbestuursaktiwiteite gepubliseer in terme van artikel 19 en 20 (b) van die Wet op Nasionale Omgewingsbestuur: Afval Wet, 2008 (Wet Nr. 59 van 2008) in welke geval daardie Wet van toepassing sal wees.</p>
<p>Listing notice 2, R. 545 of 18 June 2010, Activity No. 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 (Act No. 39 of 2004), except where such commencement requires a basic assessment in terms of Notice of No. 544 of 2010.</p>	<p>Lyskennisgewing 2, R. 545 van 18 Junie 2010, Aktiwiteit Nr 26: Die aanvang van 'n aktiwiteit, wat 'n atmosferiese lisenis vereis in terme van artikel 21 van die Wet op Nasionale Omgewingsbestuur: Lug Kwaliteit Wet, 2004 (Wet Nr 39 van 2004), behalwe waar sodanige inwerkingtreding vereis dat 'n basiese assessering in terme van 'n kennisgewing van Nr 544 van 2010 sal geld.</p>
<p>Waste Management License Application according to GN 921 of 29 November 2013 [National Environmental Management: Waste Act, 2008 (Act No. 59 of 2008)]; Category A, No. 2, Category A, No. 3, Category A, No. 5 and Category A, No. 12.</p>	<p>Afvalbestuurslisenis Aansoek volgens GK 921 van 29 November 2013 (Nasionale Omgewingsbestuur: Afval Wet, 2008 (Wet Nr. 59 van 2008): Kategorie A, Nr. 2, Kategorie A, Nr. 3, Kategorie A, Nr. 5 en Kategorie A, Nr. 12.</p>
<p>Atmospheric Emission License Application according to GN 248 of 31 March 2010 [National Environmental Management: Air Quality Act, 2004 (Act No. 39 of 2004)]; Category 3: Carbonization and Coal Gasification; 3.4. Char, charcoal and carbon black production; Char, charcoal and carbon black production (excluding electrode paste production); All installations.</p>	<p>Atmosferiese Lisenis Aansoek volgens GK 248 van 31 Maart 2010 in terme van die Wet op Nasionale Omgewingsbestuur: Lug Kwaliteit Wet, 2004 (Wet Nr. 39 van 2004); Kategorie 3: Karbonisasie en steenkoolvergassing; 3.4. Koolteer, houtskool en koolstof poeier produksie: Koolteer, houtskool en koolstof poeier (uitsluitend elektrode pasta produksie); Alle installasies.</p>
<p>Invitation to Participate:</p>	<p>Publieke Deelname Uitnodiging:</p>
<p>Should you require any additional information or wish to register as I&AP and/or inform us of any other I&APs and/or organisation and/or organ of state who should be notified, please submit your name, contact information, and interest in the matter in writing to Shangoni Management Services at the below address not later than 31 March 2014.</p>	<p>Vir enige navraag, of indien u as belanghebbende en/of geaffekteerde party wil registreer of ons wil inlig van enige ander partye en/of organisasie en/of staatsinstelling wat in kennis gestel moet word, kan u gerus vir Shangoni Management Services kontak by die ondergenoemde kontakbesonderhede, nie later as 31 Maart 2014 nie.</p>
<p>Environmental Consultants: Shangoni Management Services (Pty) Ltd PO Box 74726, Lynnwood Ridge, Pretoria, 0040 Tel: (012) 907 7036, Fax: (012) 907 1014 / 086 643 5360, E-mail: lizette@shangoni.co.za</p>	<p>Omgewingskonsultante: Shangoni Management Services (Pty) Ltd. Posbus 74726, Lynnwood Ridge, Pretoria, 0040 Tel: (012) 907 7036, Faks: (012) 907 1014 / 086 643 5360, E-pos: lizette@shangoni.co.za</p>
<p>Project Coordinator: Innovative Business Systems Management Consultants (Pty) Ltd PostNet Suite #264, Private Bag X21, Bryanston, 2021 Tel: 072 905 0913, Fax: 086 226 2560, E-mail: info@ibs-africa.com, www.ibs-africa.com</p>	<p>Projekkoördineerder: Innovative Business Systems Management Consultants (Pty) Ltd PostNet Suite #264, Privaatsak X21, Bryanston, 2021 Tel: 072 905 0913, Faks: 086 226 2560, E-pos: info@ibs-africa.com, www.ibs-africa.com</p>
<p>Project Officials:</p>	<p>Projek beamptes:</p>
<ul style="list-style-type: none"> Application for Environmental Authorisation (NWDEDECT): Ms Queen Imasiku; 014 597 3597 Waste Management License Application (NWDEDECT): Ms Joyce Mauts; 018 389 5091 	<ul style="list-style-type: none"> Aansoek om Omgewingsmagtiging (NWDEDECT): Mej Queen Imasiku; 014 597 3597 Afvalbestuurslisenis Aansoek (NWDEDECT): Mej Joyce Mauts; 018 389 5091
	

Figure 28: Wording of the notice board

4.3.2.3 Background Information Document

Notification letters and the Background Information Document (BID) developed for the proposed project provide background information pertaining to the project and are intended to inform I&APs of the project. The BID also includes a registration form which potential I&APs, stakeholders and organs of state are encouraged to complete in order to register as I&APs for the proposed project.

The Notification Letters and BID were made available to all landowners adjacent to the proposed site, as well as to all organs of state that may have jurisdiction over any aspect of the activity.

Copies of the notification letters and BID and proof of their distribution to the adjacent landowners and organs of state are attached under Appendix E. Proof of postage of the notification letters is given in the figures below. Further proofs are also attached under Appendix E.



List of REGISTERED LETTERS Lys van GEREGETREERDE BRIEWE (with an insurance option/met 'n versekeringsopsie) Full tracking and tracing/Volledige volg en spoor

Post Office

Name and address of sender:
Naam en adres van afsender: Shangoni Management Services (Pty) Ltd
Po Box 74726 Lynnwood Ridge 0040

Enquiries/Navroep
Toll-free number
Tollvry nommer
0800 111 502

No	Name and address of addressee Naam en adres van geadresseerde	Insured amount Versekerde bedrag	Insurance fee Versekeringsgeld	Postage Postgeld	Service fee Diensgeld	Affix Track and Trace customer copy Plak Volg-en-Spoor-klientafskrif
1	Bojana Platinum District Municipality PO Box 1993 Rustenburg 0300 At Quality Officer - Fanie Masi					REGISTERED LETTER Affix a postage stamp Aansluit 'n posseël RD 942 799 853 ZA CUSTOMER COPY 30102R
2	Bojana Platinum District Municipality PO Box 1993 Rustenburg 0300 At Quality Officer - Ms Evelyn Molele					REGISTERED LETTER Affix a postage stamp Aansluit 'n posseël RD 942 799 918 ZA CUSTOMER COPY 30102R
3	Bojana Platinum District Municipality PO Box 1993 Rustenburg 0300 Mr. P. Mankwadi					REGISTERED LETTER Affix a postage stamp Aansluit 'n posseël RD 942 799 935 ZA CUSTOMER COPY 30102R
4	Bojana Platinum District Municipality PO Box 1993 Rustenburg 0300 At Quality Officer - Amanda Bubu					REGISTERED LETTER Affix a postage stamp Aansluit 'n posseël RD 942 799 921 ZA CUSTOMER COPY 30102R
5	Department of Water Affairs Private bag 4557 Harburgerspoort 0310 Getsewyl Nkomo					REGISTERED LETTER Affix a postage stamp Aansluit 'n posseël RD 942 799 895 ZA CUSTOMER COPY 30102R
6	Moses Koneo Local Municipality - Ward 10 Private bag X1011 Mngose 0814 Mr. Mamba Lerato Sibha					REGISTERED LETTER Affix a postage stamp Aansluit 'n posseël RD 942 799 904 ZA CUSTOMER COPY 30102R
7	Moses Koneo Local Municipality Private bag X1011 Mngose 0814 Sharon Yasepal					REGISTERED LETTER Affix a postage stamp Aansluit 'n posseël RD 942 799 881 ZA CUSTOMER COPY 30102R
8	Mvelakweni (Pty) Ltd t/a Bojana Bus Services PO Box 0814 Rustenburg 0300 Mr. Abasi Sydney (Indra) Land Owen					REGISTERED LETTER Affix a postage stamp Aansluit 'n posseël RD 942 799 042 ZA CUSTOMER COPY 30102R
9	N.W. Dept of Agric and Rural Development Private bag X2024 Mmabatho 2735 HOB: kgabane mabagane					REGISTERED LETTER Affix a postage stamp Aansluit 'n posseël RD 942 799 878 ZA CUSTOMER COPY 30102R
10	N.W. Department of Finance Private bag X2040 Mmabatho 2735 HOB: m					REGISTERED LETTER Affix a postage stamp Aansluit 'n posseël RD 942 799 011 ZA CUSTOMER COPY 30102R
Number of letters posted Getal briewe gepos		Total Totaal	R	R	R	R

Signature of client
Handtekening van klient Orwa

Signature of accepting officer
Handtekening van aanneembeampte

The value of the contents of these letters is as indicated and compensation is not payable for a letter received unconditionally. Compensation is limited to R100,00. No compensation is payable without documentary proof. Optional insurance of up to R200,00 is available and applies to domestic registered letters only.
Die waarde van die inhoud van hierdie briewe is soos aangedui en vergoeding sal nie betaal word vir 'n brief wat sonder voorbehoud ontvang word nie. Vergoeding is beperk tot R100,00. Geen vergoeding is sonder dokumentêre bewys betaalbaar nie. Opsionele versekering van tot R2 000,00 is beskikbaar en is slegs op binnelandse geregistreerde briewe van toepassing.

Date stamp
Datumstempel

701248

List of REGISTERED LETTERS Lys van GEREGETREERDE BRIEWE (with an insurance option/met 'n versekeringsopsie) Full tracking and tracing/Volledige volg en spoor

Post Office

Name and address of sender:
Naam en adres van afsender: Shangoni Management Services (Pty) Ltd
Po Box 74726 Lynnwood Ridge 0040

Enquiries/Navroep
Toll-free number
Tollvry nommer
0800 111 502

No	Name and address of addressee Naam en adres van geadresseerde	Insured amount Versekerde bedrag	Insurance fee Versekeringsgeld	Postage Postgeld	Service fee Diensgeld	Affix Track and Trace customer copy Plak Volg-en-Spoor-klientafskrif
1	N.W. Dept of Health Private bag X2006 Mmabatho 2735 HOB: mab gen. Dr. M. Radebe					REGISTERED LETTER Affix a postage stamp Aansluit 'n posseël RD 942 798 943 ZA CUSTOMER COPY 30102R
2	N.W. Dept of Human Settlements, Public Works and Informal Settlements Private bag X2146 Mmabatho 2735 HOB: Mr M kgabane					REGISTERED LETTER Affix a postage stamp Aansluit 'n posseël RD 942 798 912 ZA CUSTOMER COPY 30102R
3	N.W. Dept of Local Gov. and Traditional Affairs Private bag X2091 Mmabatho 2735 HOB: Mankwadi Mankwadi					REGISTERED LETTER Affix a postage stamp Aansluit 'n posseël RD 942 798 926 ZA CUSTOMER COPY 30102R
4	N.W. Dept. of Public Works, Roads and Transport Private bag X2037 Mmabatho 2735 HOB: Mr. Mankwadi Mankwadi					REGISTERED LETTER Affix a postage stamp Aansluit 'n posseël RD 942 798 890 ZA CUSTOMER COPY 30102R
5	North West Department of Social Dev Private bag X2037 Mmabatho 2735 HOB: Mankwadi Mankwadi, Cecilia Mngole					REGISTERED LETTER Affix a postage stamp Aansluit 'n posseël RD 942 799 966 ZA CUSTOMER COPY 30102R
6	North West Dev Corporation (Pty) Ltd PO Box 4410 Mngose 0814 At: Tshogo, Lesibang (Indra) Land Owen					REGISTERED LETTER Affix a postage stamp Aansluit 'n posseël RD 942 799 039 ZA CUSTOMER COPY 30102R
7	Pieterburg National Park PO Box 7201 Mngose 0814 Park manager: Johannes Mankwa					REGISTERED LETTER Affix a postage stamp Aansluit 'n posseël RD 942 799 952 ZA CUSTOMER COPY 30102R
8	Vaalikop Dam Nature Reserve PO Box 1846 Mmabatho 2735 Park manager: M.M. Swart					REGISTERED LETTER Affix a postage stamp Aansluit 'n posseël RD 942 799 949 ZA CUSTOMER COPY 30102R
9						
10						
Number of letters posted Getal briewe gepos		Total Totaal	R	R	R	R

Signature of client
Handtekening van klient Orwa

Signature of accepting officer
Handtekening van aanneembeampte

The value of the contents of these letters is as indicated and compensation is not payable for a letter received unconditionally. Compensation is limited to R100,00. No compensation is payable without documentary proof. Optional insurance of up to R200,00 is available and applies to domestic registered letters only.
Die waarde van die inhoud van hierdie briewe is soos aangedui en vergoeding sal nie betaal word vir 'n brief wat sonder voorbehoud ontvang word nie. Vergoeding is beperk tot R100,00. Geen vergoeding is sonder dokumentêre bewys betaalbaar nie. Opsionele versekering van tot R2 000,00 is beskikbaar en is slegs op binnelandse geregistreerde briewe van toepassing.

Date stamp
Datumstempel

701248

Figure 29: Proof of postage of notification letters

4.3.3 I&AP register

Once all adjacent landowners, organs of state and the public were notified of the proposed project, an I&AP Register (as also provided in Appendix E) was compiled. The table below provides an extract of the I&AP Register indicating the organs of state and other I&APs that have been registered.

Table 20: Registered I&APs

No.	Department	Name
Organs of State		
1	Moses Kotane Local Municipality	Sharon Rasepal
2	Moses Kotane Local Municipality	Ms S.R. Dince (Municipal Manager)
3	Moses Kotane Local Municipality – Ward 10	Cllr. Martha Lerato Zitha
4	Bojanala Platinum District Municipality	Mr R. Mulaudzi
5	Bojanala Platinum District Municipality	Air Quality Official - Amanda Bubu
6	Bojanala Platinum District Municipality	Air Quality Official - Ms Evelyn Molotsi
7	Bojanala Platinum District Municipality	Air Quality Official - Fannie Mnisi
8	North West Department of Agriculture and Rural Development	HOD: Dr Kgabi Mogajane
9	North West Department of Local Government and Traditional Affairs	HOD: Monnapula Motlogelwa
10	North West Department of Human Settlements, Public Safety and Liaison	HOD: Mr MI Kgantsi
11	North West Department of Public Works, Roads and Transport	HOD: Mr Makgothi Thobakgale
12	North West Department of Social Development	Advocate Matshidiso Cordelia Mogale
13	North West Department of Health	Maj. Gen. Dr M. Radebe
14	North West Department of Health	Mr O.M.R. Mokate
15	Department of Water Affairs	Sebenzile Ntshangase
16	South African Heritage Resources Agency	TBC
No.	Interest/Company/Entity	Name
Registered I&APs		
1	Park Manager- Pilanesberg National Park	Mr Johnson O. Maoka
2	Bojanala Platinum District Municipality	Mr Thapelo H. Mathekga
3	Adjacent land owner - North West Development Corporation (Pty) Ltd	Mrs Tebogo Kesiamang
4	Adjacent land owner - Mvelatrans (Pty) Ltd t/a Bojanala Bus Services	Mr Albert Snyders
5	Adjacent land owner - New Era Recycling (Part of the New Era Group)	Mr Danie Van Rooyen
6	Adjacent land owner - Durab Manufacturing	Mr Anton Jonker
7	Adjacent land owner - Four Tops Engineering Service CC	Mr Essau Motloug
8	Vaalkop Dam Nature Reserve	Park Manager: Mr M Setuki
9	North West Parks and Tourism Board - Pilanesberg National	Mr Steve Dell



No.	Department	Name
	Park	

Refer also to Appendix E for a detailed I&APs Register including contact information for all registered organs of state and I&APs.

4.3.4 Public meeting(s)

No public meeting has been held nor is one anticipated at present.

4.3.5 Access and opportunity to comment on written submissions

4.3.5.1 Basic Assessment Report

This draft Basic Assessment Report will be made available to the public for review for a period of forty (40) days. A hard copy of the draft document will also be submitted to the Department of Water Affairs for review. They will have a 60 day review period, as required by Regulation 56(8) of the EIA Regulations of 18 June 2010.

An electronic copy of the draft Basic Assessment Report will also be posted on the Shangoni Management Services' website (www.shangoni.co.za) for public comment for the same period.

4.3.6 Consultation with the relevant Authorities

4.3.6.1 Application form in terms of the NEMA, 1998

The applicable Waste Management Licence application form under NEM:WA, 2008, was submitted to the North West Department of Rural, Environmental and Agricultural Development on the 12th of December 2013. A reference number (NWP/WM/BP3/2013/14) was issued by the North West Department of Rural, Environmental and Agricultural Development on the 20th of September 2013. The letter of acknowledgement indicating the above mentioned reference number is attached as Appendix G.

4.3.6.2 Authorities meeting(s)

No meetings have been held with any of the competent authorities nor are such meetings anticipated at present.

4.3.7 Further consultation with relevant Authorities

No further consultation has occurred.

4.3.8 Comments and responses

All issues, comments and questions received from the I&APs during the Basic Assessment process have been summarised in the table below. Copies of the comments received have also been included in Appendix E.



Table 21: Comments and Responses Report

Name	Company/ Department	Date received	Method of comment	Issue raised	Response
Mr O.M.R Mokate	North West Department of Health	11-03-2014	Fax	<p>SUBJECT: ACKNOWLEDGEMENT LETTER</p> <p>Your application letter dated 21 February 2014, pertaining to an Environmental Authorisation, for both a Waste Management and an Atmospheric Emission License for the Vaporox Waste Tyre Pyrolysis Plant, received on 10 March 2014, is herewith acknowledged.</p> <p>Comments on the proposed township establishment will be mailed to your office on or before 11 April 2014.</p>	<p>Initial Response:</p> <p>Your letter dated 10 March 2014 and received by Shangoni Management Services on 11 March 2014 refers: We hereby confirm receipt of our letter and take note that comments from the North West Department of Health will be sent to Shangoni Management Services' offices on or before the 11th of April 2014.</p> <p>Formal Response:</p> <p>The Department's comments are noted. Please note, however, that this Application for Environmental Authorisation is not for a township establishment, but for a Waste Tyre Pyrolysis Plant.</p>
Mr M.P Raedani	North West Department of Finance	09-04-2014	Post	<p>RESPONSE ON THE OPPORTUNITY TO REGISTER OR NOT AS THE INTERESTED AND AFFECTED PARTY</p> <p>This letter serves to acknowledge receipt of your letter dated 21 February 2014 and also appreciate the opportunity to register as an interested or affected stakeholder.</p> <p>Unfortunately the Department of Finance will not be registering as an interested or</p>	<p>Your letter dated 18 March 2014 and received on the 9th of April 2014 refers: We hereby acknowledge receipt of your correspondence and take note that the North West Department of Finance will not be registering as an Interested and Affected Party for the above mentioned project.</p>



Name	Company/ Department	Date received	Method of comment	Issue raised	Response
				affected stakeholder.	
Ms S.R. Dince (Municipal Manager)	Moses Kotane Local Municipality	06-05-2014	Email	<p>RE: NOTIFICATION OF APPLICATION FOR ENVIRONMENTAL AUTHORISATION, WASTE MANAGEMENT LICENSE AND AN ATMOSPHERIC EMISSION LICENSE FOR THE VAPOROX WASTE TYRE PYROLYSIS PLANT</p> <p>The Moses Kotane Local Municipality: Environmental & Waste Management Department has received and reviewed your Application for Environmental Authorisation, Waste Management License and an Atmospheric Emission License.</p> <p>According to the application findings your project will need the following:</p> <ul style="list-style-type: none"> Scoping and Environmental Impact Assessment Process as required by Sections 26 of 35 of Government Notice R.543 of the EIA Regulations of 18 June 2010 (for the Environmental authorisation application and the Atmospheric Emission License application). 	<p>We hereby confirm receipt of your letter and take note of the comments that you have raised. We would like to respond as follows to your comments:</p> <p>Thank you for indicating the processes to be followed and the various applications that need to be applied for.</p> <p>A Scoping and Environmental Impact Assessment Process (in support of an application for Environmental Authorisation and an Atmospheric Emission Licence) is being conducted by Shangoni Management Services for the Vaporox Waste Tyre Pyrolysis Plant. The Scoping and EIA process has been assigned the following reference number by the North West Department of Rural, Environmental and Agricultural Development: NWP/EIA/86/2013.</p> <p>A Basic Environmental Impact Assessment Process (in support of a Waste Management Licence Application) is also being conducted by Shangoni Management Services for the Vaporox Waste Tyre Pyrolysis Plant. The Basic EIA process has been assigned the following reference number by the North West Department of Rural, Environmental and Agricultural Development: NWP/WM/BP3/2013/14.</p>



Name	Company/ Department	Date received	Method of comment	Issue raised	Response
				<ul style="list-style-type: none">For the Waste Management License Application, a Basic Environmental Impact Assessment Process as required by Sections 21 to 25 of Government Notice R.543 of the EIA Regulations of 18 June 2010 will need to be conducted. <p>However the municipality has no objection regarding the proposed Vaporox Waste Tyre Pyrolysis Plant.</p> <p>Hope you find the above in order.</p>	



4.3.9 Conclusions of the PPP

In conclusion, the Public Participation exercise has provided adequate information to enable an understanding of what the proposed project activities would entail and to address the concerns and comments received during the Waste Management Licence Application Process.



5. NEED AND DESIRABILITY FOR THE ACTIVITY

A need and desirability for this project is evident from the following perspectives:

5.1 Developer/Applicant

The proposed project will generate a source of income for the applicant, Vaporox (Pty) Ltd, and is therefore desirable from an economic point of view. In terms of the REDISA (Recycling and Economic Development Initiative of South Africa) Plan, it is proposed that waste tyre producers (manufacturers and importers) will be charged a waste management fee of R2.30 + VAT for every kilogram of new tyre rubber produced. These funds will then be used for the development and support of recyclers, such as Vaporox. Vaporox will also generate revenue from the selling of the products from the pyrolysis process, namely steel, purified oil and Carbon Black.

Licensing the facility in terms of the National Environmental Management: Waste Act, 2008 (Act No. 59 of 2008), will mean that the facility will be one of only a few waste tyre pyrolysis plants, licensed in terms of environmental legislation, in the area and Province. This legal compliance will ensure that the facility can operate for the foreseeable future without the risk of prosecution for non-compliance to the law. Together with registration as a Recycler with REDISA, the legal compliance should also ensure a supply of waste tyres to the facility from waste tyre producers.

5.2 Local Community, District and Provincial Benefit

It is estimated that there are approximately 60 million legacy waste tyres in South Africa and approximately 11 million tyres are added to this total every year. These tyres are found in landfill sites, where they take up valuable space, as well as in stockpiles in residential, rural and industrial areas across South Africa. Many of the tyres are burned, releasing liquids and noxious gases such as carbon monoxide and dioxins. In some rural areas, waste tyres are also burned to generate heat, especially in winter months, resulting in health risks to those inhaling the resultant fumes (www.redisa.org.za).

Recycling of waste tyres is one way to eliminate the above mentioned problem and can be achieved through waste tyre pyrolysis. Local landfill sites will benefit from more landfill airspace being available for other waste types and people in the local, district and provincial areas will benefit from cleaner air and decreased health risks, as tyre burning will be prevented.

Local Community

The unemployment rate for the Moses Kotane Local Municipality was 37.9% according to the 2011 census (Statistics South Africa, 2011). The proposed project will generate approximately 20 new, direct employment opportunities and more than 30 new, indirect employment opportunities during the construction phase. During the operational phase, approximately 20 permanent employment

opportunities will be generated. These employment opportunities will act as a source of income for a number of households within the local municipal area. The proposed project will also stimulate other businesses, such as waste tyre collectors, especially as part of the REDISA Plan.

District and Provincial Benefit

The proposed project will form part of the country wide REDISA system and will assist in the establishment of REDISA. In doing so, the network of REDISA Transporters, Depots, Recyclers, Collection Points, Secondary Industries and Manufacturers/Importers will grow and be strengthened, leading to ever increasing employment opportunities. It is estimated that the REDISA Plan, through the establishment of the new waste tyre recycling industry, will create approximately 10 000 new employment opportunities (www.redisa.org.za).



6. CONSIDERATION OF ALTERNATIVES

The following definition of “alternatives” is given in the EIA Regulations of 18 June 2010: “alternatives”, in relation to the proposed activity, *means different means of meeting the general purpose and requirements of the activity, which may include alternatives to-*

- a) *the property on which or location where it is proposed to undertake the activity;*
- b) *the type of activity to be undertaken;*
- c) *the design or layout of the activity;*
- d) *the technology to be used in the activity;*
- e) *the operational aspects of the activity; and*
- f) *the option of not implementing the activity”.*

Typically, alternative assessments are conducted to assist in comparing various projects or attributes of projects that will occur. The most critical comparison is evaluating any proposed project against the No-Go option. The alternatives assessment then considers alternatives to project site selection for the proposed development; alternatives to layout of the development; and alternatives to construction methodologies and/or materials used for the development.

6.1 No-Go option

This alternatives assessment was conducted using a simple cost-benefit analysis, through assessing various environmental attributes. These attributes can include physical (geology and soils, surface water quality and quantity, groundwater quality and quantity); biophysical (flora and fauna, sensitive environments); and social attributes (site of archaeological or cultural importance, land use issues, social health and welfare).

The impact of the each alternative was then evaluated in terms of whether it has a positive, negative, or no impact. In this instance, the impact is not evaluated in terms of significance but rather whether or not it will arise. Positive impacts are assigned a value of 1; no impact a value of 0; and a negative impact a value of -1.

By adding all of the attribute scores for each alternative, a suitability score is derived that indicates the preferred alternative. A total positive score indicates that the project benefits outweigh the potential negative impacts, while a total negative score indicates the project environmental costs outweigh the potential benefits. Essentially, the highest scoring alternative is then carried forward for full impact evaluation.

The potential impact of the preferred project option on environmental and socio-economic attributes identified during the assessment phase is evaluated against the potential impact of the No-Go option on the same attributes. The summary of this assessment is provided in the table below.



Table 22: Development vs. No-Go option

Attribute	Development Option	No-go Option
Physical environment		
Air Pollution	-1	0
Noise Pollution	-1	0
Water Quality	0	0
Water Quantity	0	0
Visual Aesthetics	1	-1
Biophysical environment		
Fauna and Flora	0	0
Sensitive Environments	0	0
Social environment		
Traffic	-1	0
Impact on property values	1	-1
Safety and security	1	-1
Local and regional economy	1	0
Infrastructure development	1	0
Total	2	-3

As can be seen in the table above, the development option (the Waste Tyre Pyrolysis plant) is preferred to the No-Go option (no use of the existing buildings at the site), as derived from comparative analysis. While the development option has negative impacts in terms of air and noise pollution and the generation of traffic, it also has benefits in terms of visual aesthetics (as the existing, derelict buildings will be fixed), property values, safety and security, infrastructure development and the local and regional economy. The positive social impacts outweigh the negative environmental impacts to give an overall positive score of “2”, whereas the No-Go Option results in a negative score of “-3”.

6.2 Alternatives considered

The following alternatives were compared using a qualitative assessment.

6.2.1 Activity alternatives (A)

The proposed activity is the recycling and recovery of waste tyres through the use of a pyrolysis processes.

Currently, most tyres are disposed of to landfill or accumulate at various facilities or on vacant land where they are unmanaged. Alternative methods to dispose of, recycle or re-use the waste tyres include the following:



- **Alternative A1:** Tyres can be retreaded, whereby the remaining tread is removed and a new tread (rubber strip) is fused to the old “skeleton” of the tyre using vulcanisation. The quality of the retreaded tyre is, however, not high;
- **Alternative A2:** Tyres can be mechanically or cryomechanically milled/ground up and the rubber pieces used in other applications, such as for sport surfaces, carpets, playgrounds etc. If the rubber is ground up into a very fine powder, the powder can be used to reinforce new rubber products. These applications do not produce atmospheric emissions, but have a high energy usage and there is a limited market for the products;
- **Alternative A3:** It has often been attempted to reclaim scrap rubber products, but the process is difficult and costly. The quality of the reclaimed rubber is also not high and the re-selling of the reclaimed rubber as a raw material is therefore problematic; and
- **Alternative A4:** Pyrolysis presents an opportunity to produce valuable products from the waste tyres and can also result in less negative environmental impacts than for example, the burning of tyres or their disposal to landfill. The solid Char can be used as a smokeless fuel, to reinforce new rubber products or as activated Carbon. The oils can be used as fuels, a source of chemicals due to the oil’s mixture of organic compounds, or as a feedstock for the petroleum industry. Gases from the pyrolysis process consist of non-condensable organics like CO, CO₂, H₂, H₂S, CH₄, C₂H₄ and C₃H₆, and can be used as a fuel for the pyrolysis process (Juma *et al.*, 2006).

Pyrolysis is seen as the most economically viable option at this stage and is also the type of recycling plant that the applicant would like to establish. The other alternatives are less viable as they are costly, have difficult processes and also do not always have proven markets for their products.

6.2.2 Location alternatives (B)

Three location alternatives can be considered for this proposed project. The first is to construct the Waste Tyre Pyrolysis plant on an undeveloped property (Alternative B1), the second is to utilise a property with existing infrastructures suited for the proposed project (Alternative B2) and the third is to utilise a property with existing infrastructures, but which are not suited for the proposed project (Alternative B3).

Alternative B1: The use of an undeveloped property would entail the purchase or leasing of open land by the applicant and the development of the property from scratch. This would include the installation of all bulk services as well as the construction of the necessary buildings within which the pyrolysis plant would then be installed. This alternative would entail significant financial costs for site establishment, in addition to the costs for the pyrolysis plant itself, and is therefore not economically feasible. It is also possible that such an undeveloped site may lie within a Critical Biodiversity Area in terms of the North West Biodiversity Conservation Plan and its development could therefore result in negative impacts in terms of fauna and flora loss.



Alternative B2: The use of a property with existing buildings which are suited to the proposed project is the preferred alternative and is the situation at the proposed/preferred site (25°16'12.40"; 27°16'25.36"). The proposed site has three existing buildings that can be used for the pyrolysis process and associated processes, such as the storage of chemicals and products (e.g. steel, oil and Carbon black). Most of the site is already in a disturbed site (where the buildings are situated) and an open area remains where waste tyres can be stored prior to processing. Existing bulk services exist to the property, although the bulk services supply system would need to be repaired. An existing road and access gate is also present at the proposed site and the site is located close to main access roads to Mogwase CBD.

Alternative B3: The use of a property with existing buildings that are not suitable to the proposed project, such as a property where the existing buildings were used for offices or as houses, is not a feasible alternative for the following reasons: The buildings would not be big enough nor designed for industrial use and would need to be demolished so that suitable buildings could be constructed. This would entail significant financial costs, in addition to the costs for the pyrolysis plant itself, and is therefore not economically feasible.

6.2.3 Site layout alternatives (C)

On the proposed site, there are limited site layout alternatives that can be considered. The alternatives include which of the three existing buildings are used for the pyrolysis plant, the storage of raw materials, such as chemicals, and the storage of product, such as steel, Carbon black and oil. The ideal use of each of the three buildings is being considered as part of the planning phase for the project. It is anticipated that Buildings 1 and 3 will be used for storage purposes and Building 2 for the pyrolysis plant itself. As only one half of the site is still open space, this area will be used for the storage of waste tyres prior to their processing.

6.2.4 Process and Design alternatives (D)

The Waste Tyre Pyrolysis process is a relatively new process and is to a certain extent still being perfected. A number of process alternatives are being considered by the applicant and plant designer and the process that will be followed at the proposed plant has not yet been finalised. Process alternatives include, for example, the way in which the feedstock (waste tyres) will be cleaned, by either using water or compressed air. Other alternatives include the way in which the feedstock will be introduced into the reactor, such as through a gravity feed system or a bottom feeding system, and the type of reactor that will be used, for example a horizontal or vertical reactor. Vertical reactors can be fluidized bed, entrained bed or fixed bed reactors. The process can also be a continuous or batch process. All these alternatives are being considered during the current, conceptual design of the Waste Tyre Pyrolysis plant.



7. ENVIRONMENTAL IMPACT ASSESSMENT

7.1 Aims of Environmental Impact Assessment

Potential environmental impacts (biophysical) associated with the proposed Waste Tyre Pyrolysis Plant have been identified. This Environmental Impact Assessment (EIA) phase aims to adequately investigate and address all potentially significant environmental issues in order to provide the North West Department of Rural, Environmental and Agricultural Development with sufficient information to make an informed decision regarding the proposed project.

This part of the document focuses on the identification of the major potential impacts that the proposed activities, processes and actions may have on the surrounding environment. It indicates the major impacts that these activities may have on the environmental components associated with the site, as required in terms of R.543 of the EIA Regulations, 2010.

The EIA aims to achieve the following:

- To provide a detailed assessment of the biophysical environments affected by the proposed project;
- To assess impacts on the study area in terms of environmental criteria; and
- To identify and recommend appropriate mitigation measures for potentially significant environmental impacts.

This BAR addresses the following:

- A detailed description of the proposed project;
- Detailed assessment of the impacts identified that were determined to be potentially significant;
- Recommendations regarding the mitigation of significant impacts; and
- To meet the requirements and to comply with the necessary legislation and Acts.

Any specialist studies are combined into this consolidated report to allow for easy assessment of the potential aspects with associated impacts.

7.2 Environmental Impact Assessment Procedure

The environmental risk of any aspect is determined by a combination of parameters associated with the impact. Each parameter connects the physical characteristics of an impact to a quantifiable value to rate the environmental risk.

Impact assessments should be conducted based on a methodology that includes the following:

- Clear processes for impact identification, predication and evaluation;
- Specification of the impact identification techniques;



- Criteria to evaluate the significance of impacts;
- Design of mitigation measures to lessen impacts;
- Definition of the different types of impacts (indirect, direct or cumulative); and
- Specification of uncertainties.

After all impacts have been identified, the nature of each impact can be predicted. The impact prediction will take into account physical, biological, socio-economic and cultural information and will then estimate the likely parameters and characteristics of the impacts. The impact prediction will aim to provide a basis from which the significance of each impact can be determined and appropriate mitigation measures can be developed.

The risk assessment methodology is based on defining and understanding the three basic components of the risk, i.e. the source of the risk, the pathway and the target that experiences the risk (receptor). Refer to Figure 30 below for a model representing the above principle (as contained in the DWA's Best Practice Guideline: G4 – Impact Prediction).

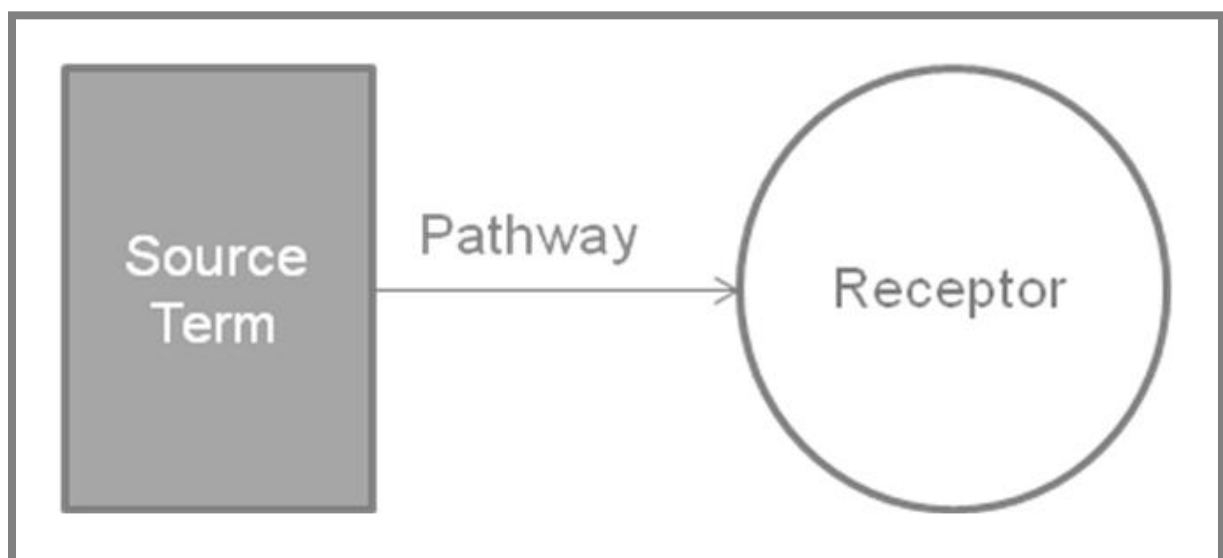


Figure 30: DWA's model for impact prediction (risk assessments)

Tables 23 and 24 below indicate the methodology to be used in order to assess the Probability and Magnitude of the impact, respectively, and Table 25 provides the Risk Matrix that will be used to plot the Probability against the Magnitude in order to determine the Severity of the impact.



Table 23: Determination of Probability of impact

Frequency of Aspect / Unwanted Event	Score	Availability of pathway from the source to the receptor	Score	Availability of receptor	Score
Never known to have happened, but may happen	1	A pathway to allow for the impact to occur is never available	1	The receptor is never available	1
Known to happen in industry	2	A pathway to allow for the impact to occur is almost never available	2	The receptor is almost never available	2
< once a year	3	A pathway to allow for the impact to occur is sometimes available	3	The receptor is sometimes available	3
Once per year to up to once per month	4	A pathway to allow for the impact to occur is almost always available	4	The receptor is almost always available	4
Once a month - Continuous	5	A pathway to allow for the impact to occur is always available	5	The receptor is always available	5

Step 1: Determine the **PROBABILITY** of the impact by calculating the average between the Frequency of the Aspect, the Availability of a pathway to the receptor and the availability of the receptor.



Table 24: Determination of Magnitude of Impact

Source								Receptor			
Duration of impact	Score	Extent	Score	Volume / Quantity / Intensity	Score	Toxicity / Destruction Effect	Score	Reversibility	Score	Sensitivity of environmental component	Score
Lasting days to a month	1	Effect limited to the site. (metres);	1	Very small quantities / volumes / intensity (e.g. < 50L or < 1Ha)	1	Non-toxic (e.g. water) / Very low potential to create damage or destruction to the environment	1	Bio-physical and/or social functions and/or processes will remain unaltered.	1	Current environmental component(s) are largely disturbed from the natural state. Receptor of low significance / sensitivity	1
Lasting 1 month to 1 year	2	Effect limited to the activity and its immediate surroundings. (tens of metres)	2	Small quantities / volumes / intensity (e.g. 50L to 210L or 1Ha to 5Ha)	2	Slightly toxic / Harmful (e.g. diluted brine) / Low potential to create damage or destruction to the environment	2	Bio-physical and/or social functions and/or processes might be negligibly altered or enhanced / Still reversible	2	Current environmental component(s) are moderately disturbed from the natural state. No environmentally sensitive components.	2
Lasting 1 – 5 years	3	Impacts on extended area beyond site boundary (hundreds of metres)	3	Moderate quantities / volumes / intensity (e.g. > 210 L < 5000L or 5 – 8Ha)	3	Moderately toxic (e.g. slimes) Potential to create damage or destruction to the environment	3	Bio-physical and/or social functions and/or processes might be notably altered or enhanced / Partially reversible	3	Current environmental component(s) are a mix of disturbed and undisturbed areas. Area with some environmental sensitivity (scarce / valuable environment etc.).	3
Lasting 5 years to Life of Organisation	4	Impact on local scale / adjacent sites (km's)	4	Very large quantities / volumes / intensity (e.g. 5000 L – 10 000L or 8Ha– 12Ha)	4	Toxic (e.g. diesel & Sodium Hydroxide)	4	Bio-physical and/or social functions and/or processes might be considerably altered or enhanced / potentially irreversible	4	Current environmental component(s) are in a natural state. Environmentally sensitive environment / receptor (endangered species / habitats etc.).	4
Beyond life of Organization / Permanent impacts	5	Extends widely (nationally or globally)	5	Very large quantities / volumes / intensity (e.g. > 10 000 L or > 12Ha)	5	Highly toxic (e.g. arsenic or TCE)	5	Bio-physical and/or social functions and/or processes might be severely/substantially altered or enhanced / Irreversible	5	Current environmental component(s) are in a pristine natural state. Highly Sensitive area (endangered species, wetlands, protected habitats etc.)	5

Step 2: Determine the **MAGNITUDE** of the impact by calculating the average of the factors above.



Table 25: Determination of Severity of Impact

ENVIRONMENTAL IMPACT RATING / PRIORITY					
	MAGNITUDE				
PROBABILITY	1 Minor	2 Low	3 Medium	4 High	5 Major
5 Almost Certain	Low	Medium	High	High	High
4 Likely	Low	Medium	High	High	High
3 Possible	Low	Medium	Medium	High	High
2 Unlikely	Low	Low	Medium	Medium	High
1 Rare	Low	Low	Low	Medium	Medium

Step 3: Determine the **SEVERITY** of the impact by plotting the averages that were obtained above for Probability and Magnitude in the table below.

7.3 Description of Environmental Impacts

The aim of this section of this Basic Assessment report is to provide information regarding the potential environmental impacts associated with the proposed activities. In order to provide background information and a framework for the environmental risk assessment, a description of the different phases of the project is provided below. Refer to the tables below for the impacts associated with the Waste Tyre Pyrolysis project.

7.3.1 Design and Planning Phase

- Designing, planning and sourcing of the Waste Tyre Pyrolysis plant technology;
- Designing and planning of the waste tyre storage area;
- Designing and sourcing of abatement measures;
- Designing and sourcing of the storage vessels, such as for the storage of oil, chemicals and Liquefied Petroleum Gas;
- Designing and sourcing of the water storage vessels/containers;
- Designing or sourcing of the backup generator; and
- Compilation of plans for the restoration of existing roofs, buildings, floors, ablution facilities, electrical systems, pipeline systems (water and sewage) and geysers.

7.3.2 Construction and Installation Phase

- Fixing and revamping the existing buildings;
- Resurfacing or fixing existing concrete floors within the existing buildings;



- Replacement of vandalised electrical cables and stolen pipes;
- Replacement of all geysers;
- Restoration of all ablution facilities;
- Installation/construction of the Waste Tyre Pyrolysis plant and its associated infrastructures;
- Installation/construction of oil storage tanks and other storage structures, such as for the storage of chemicals, like catalysts, and end products, such as Carbon black;
- Installation of the backup generator;
- Installation/construction of the water storage tank(s);
- Demarcation or construction of the waste tyre storage area; and
- Concurrent rehabilitation of disturbed areas, where applicable.

7.3.3 Operational Phase

- The storage of waste tyres (onsite and possibly also off-site);
- The shredding of waste tyres to remove the steel within each tyre;
- The processing of the shredded tyres in the pyrolysis plant;
- The cleaning/scrubbing of gas produced during the pyrolysis process;
- The extraction of purified, water cooled oil;
- The extraction of Carbon (Char) and its further processing to Carbon black;
- The storage of removed steel;
- The storage of purified oil in storage tanks;
- The storage of Carbon black in silos and bags;
- The removal of product (steel, oil and Carbon black) from the site; and
- The pumping of sewage off site into the municipal sewage system.

7.3.4 Decommissioning Phase

Closure and decommissioning of the pyrolysis plant is not anticipated for the foreseeable future. Should the facility close, a detailed closure and rehabilitation plan will be submitted to the North West Department of Rural, Environmental and Agricultural Development prior to decommissioning.



7.3.5 Impacts associated with the Waste Tyre Pyrolysis Plant (GN. No R 921, Category A of 29 November 2013: Activity Numbers 2, 3, 5 and 12)

Table 26: Planning and Design Phase

Activity:											
<ul style="list-style-type: none"> Planning and design of the Waste Tyre Pyrolysis Plant 											
Aspect:											
<ul style="list-style-type: none"> Inadequate design of the Waste Tyre Pyrolysis Plant and its abatement measures Inadequate design of storage vessels for pyrolysis oil, chemicals and LPG Inadequate design of the Waste Tyre Storage Area Inadequate design of the ablution facilities Inadequate design, repair and/or replacement of the sewerage and water pipeline systems Inadequate design of the water storage vessels Inadequate design or ineffective operation of the backup diesel generator Inadequate planning for the construction of the Waste Tyre Pyrolysis Plant 											
Nature and significance of environmental impact											
Impact Description	Risk rating (before mitigation)			Environmental Objective	Management / Mitigation / Monitoring Measures	Timeframe	Responsibility	Risk rating (after mitigation)			Applicable legislation / other documents
	Probability	Magnitude	Severity					Probability	Magnitude	Severity	
Planning and Design Phase											
<ul style="list-style-type: none"> Air pollution (generation of atmospheric emissions) due to the inadequate design of the plant and its' abatement measures Generation of excessive noise due to the inadequate design of the Waste Tyre Pyrolysis Plant Soil, stormwater or groundwater pollution due to the inadequate design of the Waste Tyre Pyrolysis Plant Injury to workers due to unsafe operating conditions should the Waste Tyre Pyrolysis Plant not be designed correctly Resource wastage due to the inadequate design of the Waste Tyre Pyrolysis Plant 	2	3	M	To ensure adequate design of the Waste Tyre Pyrolysis Plant	<ul style="list-style-type: none"> The Waste Tyre Pyrolysis plant must be designed to minimise the release of atmospheric emissions. A pipeline chimney stack height of 18.75m is recommended. Should a pipeline chimney stack height of 4m be chosen, the possibility of abatement technology being required must be considered when finalising the designs for the pyrolysis plant. The provisions and recommendations of the Atmospheric Impact Assessment Report and Atmospheric Emission License should be taken into account when the pyrolysis plant design is finalised. The Waste Tyre Pyrolysis plant must be designed to minimise the excessive generation of noise. Adequate silencers should be considered for all equipment and machinery. The Waste Tyre Pyrolysis plant must be designed to prevent the release of waste and effluent into the environment. Product storage areas must be designed to be within existing buildings and bunded areas, where applicable. The washing area for the tyres must be designed so that the 	Before construction commences	<ul style="list-style-type: none"> Vaporox (Pty) Ltd Plant designer 	1	2	L	<ul style="list-style-type: none"> NEMA, 1998



				<p>wash water can be contained and re-used. Should any tyre wash water need to be disposed of into the municipal sewage disposal system, the design of the wash water system must ensure that the wash water is of such a quality that it will be permitted within the municipal system.</p> <ul style="list-style-type: none"> The Waste Tyre Pyrolysis plant must be designed with safety precautions, such as safety valves and Carbon monoxide (CO) sensor and alarm systems. The design of the Waste Tyre Pyrolysis must take the Environmental Regulations for Workplaces, 1987, into consideration. The Waste Tyre Pyrolysis plant must be designed to re-use its by-products as far as possible. For example, the washing system for the waste tyres can be designed as a closed system so that the wash water can be re-used to clean the tyres. The pyrolysis plant can also be designed to re-use the pyro-gases that it will generate to fuel the reactor vessel. 							
<ul style="list-style-type: none"> Air pollution (release of fugitive emissions) due to the inadequate design of the pyrolysis oil, chemical and LPG storage vessels Soil, stormwater or groundwater pollution due to the inadequate design of the pyrolysis oil, chemical and LPG storage vessels 	2	3	M	To ensure adequate design of the storage vessels for pyrolysis oil, LPG and chemicals	<ul style="list-style-type: none"> The oil storage tanks must be designed in accordance with SANS 10089-1:2008 (The Petroleum Industry Part 1: Storage and distribution of petroleum products in above-ground bulk installations). The LPG storage tank must be designed in accordance with SANS 10087-3:2008 (The handling, storage, distribution and maintenance of liquefied petroleum gas in domestic, commercial and industrial installations). 	Before construction commences	<ul style="list-style-type: none"> Vaporox (Pty) Ltd Plant designer 	1	3	L	<ul style="list-style-type: none"> NEMA, 1998
<ul style="list-style-type: none"> Air pollution (generation of dust) due to the inadequate design of the Waste Tyre Storage Area Soil erosion due to the inadequate design of the Waste Tyre Storage Area 	2	2	L	To ensure adequate design of the Waste Tyre Storage Area	<ul style="list-style-type: none"> The design of the Waste Tyre Storage Area must be in accordance with the Waste Tyre Regulations, 2009. Adequate stormwater management measures must be designed for the Waste Tyre Storage Area. 	Before construction commences	<ul style="list-style-type: none"> Vaporox (Pty) Ltd Plant designer 	1	2	L	<ul style="list-style-type: none"> NEMA, 1998
<ul style="list-style-type: none"> Soil, stormwater or groundwater pollution due to the inadequate design of the ablution facilities 	2	2	L	To ensure adequate design of the ablution facilities	<ul style="list-style-type: none"> The planning phase must determine whether the existing ablution facilities will be sufficient for the maximum number of workers that will be present at the plant on any given day. If existing facilities are not sufficient, additional facilities must be constructed. The current ablution facilities must be repaired and upgraded to acceptable standards. 	Before construction commences	<ul style="list-style-type: none"> Vaporox (Pty) Ltd Plant designer 	1	2	L	<ul style="list-style-type: none"> NEMA, 1998
<ul style="list-style-type: none"> Soil, stormwater or groundwater pollution due to the inadequate design, repair and/or replacement of the sewerage pipeline system Wastage of a valuable natural resource (water) due to the 	2	3	M	To ensure adequate design, repair and/or replacement of the sewerage and water pipeline systems	<ul style="list-style-type: none"> All broken or damaged sewerage and water pipelines must be replaced by suitable, new pipelines, should effective repair not be possible. The new pipelines must be designed with 	Before construction commences	<ul style="list-style-type: none"> Vaporox (Pty) Ltd Plant designer 	1	2	L	<ul style="list-style-type: none"> NEMA, 1998



inadequate design, repair and/or replacement of the water pipeline system					durability in mind. • Meters must be installed to monitor the volume of water used at the pyrolysis plant.						
• Wastage of a valuable natural resource (water) due to the inadequate design of the water storage vessels	2	2	L	To ensure adequate design of the water storage vessels	• Suitable water storage vessels must be chosen for the storage of cooling water on site. An examples of such a vessel is a JoJo tank. • An inspection schedule must be compiled so that the water storage vessels are regularly checked for leakages.	Before construction commences	• Vaporox (Pty) Ltd • Plant designer	1	1	L	• NEMA, 1998
• Wastage of a valuable natural resource (diesel) due to the inadequate design or ineffective operation of the backup generator	2	2	L	To ensure adequate design and effective operation of the backup diesel generator	• The generator storage area must be designed to have a concrete floor, bund wall and sump system with sufficient capacity for the volume of diesel that the generator can take. • A maintenance schedule must be compiled for the generator and it must be operated as prescribed by the manufacturer.	Before construction commences	• Vaporox (Pty) Ltd • Plant designer	1	1	L	• NEMA, 1998
• Delays due to poor planning. • Legal non-compliances to the Environmental Authorisation and EMP. • Harm to the environment.	3	3	M	To ensure pro-active planning for the construction phase of the Waste Tyre Pyrolysis Plant	• Obtain an Atmospheric Emission License and Waste Management License before commencing with the construction phase of the proposed project. • Obtain approval of the Waste Management Plan from the local municipality. • Obtain permission from the local municipality for the discharge of washwater into the municipal sewage disposal system, if required. • The approved EMP and Environmental Authorisation must be binding on the construction contractor and included in the tender documentation and contracts. • Adequate planning and scheduling of the construction activities to allow for disruptions caused by rain and wet conditions. The scheduling must make provision for environmental training/awareness raising for workers prior to the commencement of construction. Records of all training must be maintained. • Adjacent land owners must be timeously informed that the construction phase will commence and must be kept informed of the progress throughout. • Appoint an independent Environmental Control Officer (ECO) prior to the commencement of the construction phase. • Ensure that a complaints register is kept at the construction site from the first day of construction. • Ensure that the Environmental Authorisation and EMP are kept at the construction site from the first day of construction. • Source unskilled labour locally, wherever possible. • A construction site plan must be compiled and	Before construction commences	• Vaporox (Pty) Ltd • Plant designer	1	2	L	• NEMA, 1998



				approved by Vaporox and the ECO. The site plan must include the location of the construction camp, toilets, stores and site office.						
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Table 27: Environmental impact assessment: General Environment

Activity:											
<ul style="list-style-type: none"> Construction activities, repair activities and the installation and assembly of the Waste Tyre Pyrolysis Plant. Operation of the Waste Tyre Pyrolysis Plant. 											
Aspect:											
<ul style="list-style-type: none"> Lack of knowledge amongst workers and contractors in terms of how their actions may impact on the environment. 											
Nature and significance of environmental impact											
Impact Description	Risk rating (before mitigation)			Environmental Objective	Management / Mitigation / Monitoring Measures	Timeframe	Responsibility	Risk rating (after mitigation)			Applicable legislation / other documents
	Probability	Magnitude	Severity					Probability	Magnitude	Severity	
Construction Phase											
Harm to the environment in general (this includes pollution of soil and water resources, as well as harm to employees and wasteful practices in terms of resource use and waste management) during construction of the Waste Tyre Pyrolysis Plant.	3	2	M	To prevent harm to the environment by educating workers and contractors.	<ul style="list-style-type: none"> The contractor is to ensure that all employees, including sub-contractors and their employees, attend onsite Environmental Awareness/Training prior to commencing work on site. Follow-up Environmental Awareness/Training may be required from time to time as new subcontractors or crews commence work or for specific activities that may potentially impact the environment. The contractor is to maintain accurate records of any training undertaken. The ECO shall monitor the contractor's compliance with the requirement to provide sufficient environmental awareness training to all site staff. Training is to cover all aspects of the EMP and procedures to be followed. All construction workers shall be issued with ID badges and clearly identifiable uniforms. 	During the construction phase.	<ul style="list-style-type: none"> Construction contractor ECO 	2	2	L	<ul style="list-style-type: none"> NEMA, 1998 OHSA, 1993
Operational Phase											
Harm to the environment in general (this can include pollution of soil and water resources, as well as harm to employees and wasteful practices in terms of resource use and waste management) during operation of the Waste Tyre Pyrolysis Plant.	3	3	M	To prevent harm to the environment by educating workers and contractors.	<ul style="list-style-type: none"> All employees are required to attend onsite Environmental Awareness/Training prior to commencing work on site. Follow-up Environmental Awareness/Training may be required from time to time as new employees commence work or for specific activities that may 	Life of operation	Facility Manager	2	2	L	<ul style="list-style-type: none"> NEMA, 1998 OHSA, 1993



				<p>potentially impact the environment.</p> <ul style="list-style-type: none"> The facility manager is to maintain accurate records of any training undertaken. Training is to cover all aspects of the EMP and procedures to be followed. 					
Decommissioning Phase									
<p>Closure and decommissioning of the pyrolysis plant is not anticipated for the foreseeable future. Should the facility close, a detailed closure and rehabilitation plan will be submitted to the North West Department of Rural, Environmental and Agricultural Development prior to decommissioning.</p>	N/A								

Table 28: Environmental impact assessment: Atmosphere and Noise

Activity:											
<ul style="list-style-type: none"> Construction activities, repair activities and the installation and assembly of the Waste Tyre Pyrolysis Plant. Operation of the Waste Tyre Pyrolysis Plant. 											
Aspect:											
<u>Construction Phase</u>											
<ul style="list-style-type: none"> Noise generated by additional construction vehicles and equipment during the construction activities. 											
<u>Operational Phase</u>											
<ul style="list-style-type: none"> Increased traffic flow to the site. Noise generated by the pyrolysis process and vehicles travelling to and from the facility. 											
Nature and significance of environmental impact											
Impact Description	Risk rating (before mitigation)			Environmental Objective	Management / Mitigation / Monitoring Measures	Timeframe	Responsibility	Risk rating (after mitigation)			Applicable legislation / other documents
	Probability	Magnitude	Severity					Probability	Magnitude	Severity	
Construction Phase											
<p>According to Jorgensen & Johnson (1981), the noise levels generated by general construction activities on a building site can reach levels of approximately 70 dB, caused by for instance heavy machinery. It can therefore be assumed that the proposed development will have a negative impact on the environmental noise of the area once construction starts.</p> <p>Sound is inversely proportional to the distance from the source and can get absorbed by buildings and vegetation barriers. Noise intensities (dB) will be at their highest on site and will decrease as one moves away from their sources.</p> <p>The noise decline curve gives an indication of how noise generated at the site will decrease with distance. It shows the distance that the sound would have travelled upon reaching a</p>	4	3	H	To minimise noise generation during the construction phase.	<ul style="list-style-type: none"> Schedule activities that will generate the most noise during times of the day that will result in least disturbance to adjacent industries. Site workers and contractors will adhere to the requirements of the Occupational Health and Safety Act, 1993 (Act No. 85 of 1993) regarding hearing protection and noise control measures. Regular maintenance of vehicles and equipment. All equipment and machinery should be fitted with adequate silencers. Working hours should be restricted to daylight hours. No sound amplification equipment, such as sirens, loud hailers or hooters are to be used on site 	During the construction phase.	<ul style="list-style-type: none"> Construction contractor ECO 	3	3	M	<ul style="list-style-type: none"> NEMA, 1998 NEM: AQA, 2004 OHSA, 1993 Noise Control Regulations, 1992

<p>level of 60 dB, prescribed by the SABS as being the acceptable limit for environmental noise. According to the noise decline curve, at a distance of 27 metres from the construction site, the generated noise would have decreased to a level of 60 dB and at a distance of 45 metres it would have decreased to approximately 55dB. It can therefore be said that noise travelling further than 45 metres will have a low impact on neighbouring receptors.</p> <p>The site is situated within an existing industrial area and is surrounded by other industries that generate varying levels of noise. The site is also zoned for Industrial purposes. There are no known sensitive receptors, such as residential dwellings, within the immediate vicinity of the site. The construction activities will mostly entail repairs to existing infrastructure as well as the installation/construction of the Waste Tyre Pyrolysis plant and its associated structures.</p>					<p>except in emergencies and no amplified music is permitted on site.</p> <ul style="list-style-type: none"> • If work is to be undertaken outside of normal work hours permission must be obtained from the ECO and the facility manager. • No noisy work is to be conducted over the weekends or on public holidays. • The relevant stipulations of the Noise Control Regulations, 1992 (Government Notice No. 154 of 10 January 1992) must be adhered to. • A complaints register must be kept onsite. The register must record the following: Date when complaint was received, name of person who reported the complaint, details of the complaint and when and how concern was addressed. 					
Operational Phase										
<p>Disturbance and nuisance to adjacent receptors due to noise generated by the operational activities.</p> <p>The site is situated within an industrial area and is surrounded by other industries. There are no known sensitive receptors, such as residential dwellings, within the immediate vicinity of the site.</p>	4	2	M	<p>To minimise the noise and nuisance generated by the operational activities.</p>	<ul style="list-style-type: none"> • The site workers and contractors must adhere to the requirements of the Occupational Health and Safety Act, 1993 (Act No. 85 of 1993) regarding hearing protection and noise control measures. • Regular maintenance of vehicles, the back-up generator and equipment. • All equipment and machinery should be fitted with adequate silencers. • No sound amplification equipment, such as sirens, loud hailers or hooters are to be used on site except in emergencies and no amplified music is permitted on site. • If work is to be undertaken outside of normal work hours permission must be obtained from the ECO and the facility manager. • No noisy work is to be conducted over weekends or on public holidays. • The relevant stipulations of the Noise Control Regulations, 1992 (Government Notice No. 154 of 10 January 1992) must be adhered to. • A complaints register must be kept onsite. The register must record the following: Date when complaint was received, name of person who reported the complaint, details of the complaint and when and how concern was addressed. 	Life of operation	Facility Manager	3	1	<ul style="list-style-type: none"> • NEMA, 1998 • NEM: AQA, 2004 • Noise Control Regulations, 1992
Decommissioning Phase										
<p>Closure and decommissioning of the pyrolysis plant is not anticipated for the foreseeable future. Should the facility close, a detailed closure and rehabilitation plan will be submitted to the North West Department of Rural, Environmental and</p>	N/A									



Agricultural Development prior to decommissioning.	
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Table 29: Environmental impact assessment: Soil

Activity:											
<ul style="list-style-type: none"> Construction activities, repair activities and the installation and assembly of the Waste Tyre Pyrolysis Plant. Operation of the Waste Tyre Pyrolysis Plant. 											
Aspect:											
Construction Phase											
<ul style="list-style-type: none"> Loss of topsoil due to ineffective topsoil removal and storage. Soil erosion due to the clearance of vegetation. Inadequate concurrent rehabilitation. 											
Operational Phase											
<ul style="list-style-type: none"> Incorrect management of stormwater runoff. 											
Nature and significance of environmental impact											
Impact Description	Risk rating (before mitigation)			Environmental Objective	Management / Mitigation / Monitoring Measures	Timeframe	Responsibility	Risk rating (after mitigation)			Applicable legislation / other documents
	Probability	Magnitude	Severity					Probability	Magnitude	Severity	
Construction Phase											
Degradation and loss of a valuable resource (topsoil), where degraded vegetation needs to be cleared for the waste tyre storage area.	3	3	M	To reduce the duration and extent of topsoil exposure so as to preserve it as a resource and protect it from erosion.	<ul style="list-style-type: none"> Topsoil (top 150mm) is to be stockpiled in discrete areas and retained for future landscaping efforts around the waste tyre storage area. Any sub-soil or rocks removed should also be stockpiled separately and be used during the rehabilitation. Cleared vegetation should be used as a brush pack on topsoil stockpiles for erosion prevention. Minimise the length and steepness of slopes. If sterilisation of the topsoil has occurred during stockpiling, inorganic fertilisers can be used to supplement the soils before seeding of the area takes place. Replace topsoil concurrent with construction, whenever possible. Cordon off areas under rehabilitation using danger tape. If necessary, these areas should be fenced off to prevent vehicular, pedestrian and livestock access. Aim to replace stockpiled topsoil to its original depth. If there is not enough topsoil available from a particular soil zone, topsoil of a similar quality may 	During the construction phase.	<ul style="list-style-type: none"> Construction contractor ECO 	2	2	L	<ul style="list-style-type: none"> NEMA, 1998

					<p>be used to replace it. The suitability of substitute topsoil will be determined by a soil analysis and approved by the ECO.</p> <ul style="list-style-type: none"> • Compacted soil should be ripped to ensure effective re-vegetation. • Work necessary additives, as indicated by the soil analysis, into the soil. • Re-vegetation by indigenous grass species. • If areas show no specific vegetation growth within three months, the areas shall receive additional topsoil, ripped to a depth of 100mm and re-planted. • Soil stabilising measures could include rotovating in straw bales (at a rate of 1 bale/20m²), applying mulching or brush packing, or creating windbreaks using brush or bales. 						
Operational Phase											
Soil erosion due to improper management of stormwater onsite.	3	2	M	To ensure adequate stormwater management and to prevent soil erosion.	<ul style="list-style-type: none"> • The site must have an adequate and effective stormwater management system in place. • Stormwater measures should be inspected on a regular basis in order to ensure that the structures are functional and not causing soil erosion. • Where necessary, place culverts underneath road foundations. 	Life of operation	Facility Manager	2	1	L	• NEMA, 1998
Decommissioning Phase											
Closure and decommissioning of the pyrolysis plant is not anticipated for the foreseeable future. Should the facility close, a detailed closure and rehabilitation plan will be submitted to the North West Department of Rural, Environmental and Agricultural Development prior to decommissioning.	N/A										

Table 30: Environmental impact assessment: Soil, stormwater and groundwater pollution

<p>Activity:</p> <ul style="list-style-type: none"> • Construction activities, repair activities and the installation and assembly of the Waste Tyre Pyrolysis Plant. • Operation of the Waste Tyre Pyrolysis Plant.



- Aspect:**
Construction Phase
- Incorrect management, storage and disposal of concrete and cement or spillages from equipment used for construction (e.g. cement mixers).
 - Incorrect management, storage and disposal of chemicals.
 - Incorrect management, storage and disposal of construction, general and hazardous waste.
 - Unsanitary conditions on site.
 - Incorrect management and disposal of contaminated wash water or wastewater.
 - Leaking and/or spillages of fuels, greases and oils.
- Operational Phase**
- Incorrect management, storage and disposal of chemicals and fuels.
 - Incorrect management, storage and disposal of general and hazardous waste.
 - Unsanitary conditions on site.
 - Incorrect management and disposal of contaminated wash water or wastewater.
 - Incorrect management and contamination of stormwater runoff.
 - Leaking or broken sewerage pipes.
 - Incorrect storage of waste tyres and shredded tyres.
 - Inadequate storage of oil, such as on a permeable surface.
 - Inadequate storage of ash.

Nature and significance of environmental impact											
Impact Description	Risk rating (before mitigation)			Environmental Objective	Management / Mitigation / Monitoring Measures	Timeframe	Responsibility	Risk rating (after mitigation)			Applicable legislation / other documents
	Probability	Magnitude	Severity					Probability	Magnitude	Severity	
Construction Phase											
Soil, stormwater and groundwater pollution due to spillages and/or improper handling-, storage-, mixing- or disposal- of cement and concrete.	3	3	M	To prevent the pollution of soil, stormwater and groundwater as a result of spillage, improper handling, storage, mixing or disposal of cement and concrete.	<ul style="list-style-type: none"> • Cement may only be mixed on an impermeable surface (not on bare soil). • Dry cement must be removed from the soil surface to prevent an impermeable layer forming on top of the soil. The cement must be disposed of together with any building rubble. • Ready-mix trucks are not permitted to clean chutes on site. Cleaning into foundations or a dedicated cleaning pit is permitted. • Bricklayers and plasterers are to minimise any cement spill or runoff in their work area and are to ensure that the work area is cleaned of all cement spillage at the end of each workday. • Both used and unused cement bags are to be stored in weatherproof containers so as not to be affected by rain or runoff. • Contaminated soil resulting from concrete or cement spills, including residue produced by the washing of cavities, are to be removed immediately after the spillage has occurred and placed on the appropriate 	During the construction phase.	<ul style="list-style-type: none"> • Construction contractor • ECO 	2	2	L	<ul style="list-style-type: none"> • NEMA, 1998

				<p>rubble stockpile.</p> <ul style="list-style-type: none"> • Runoff from the washing out of wall cavities is to be contained against the building by excavations or berms around the foundations. All reasonable measures must be taken to prevent the dirty water from contaminating the environment. 						
<p>Soil, stormwater and groundwater pollution due to poor management and accidental spills of hazardous chemical substances including fuel, greases and oils used onsite.</p>	3	3	M	<p>To prevent and minimise soil and water pollution as a result of poor management and accidental spills of hazardous chemical substances including fuel, greases and oils used onsite.</p> <ul style="list-style-type: none"> • Identify all hazardous chemical substances used onsite including fuel, greases and oils. • Obtain the material safety data sheet of each of hazardous chemical substance. • Material Safety Data Sheets for all hazardous chemical substances must be readily available on site. • Ensure that the material safety data sheets have sufficient information to enable the user to take the necessary measures to protect his/her health and safety and that of the environment. • Train staff on the use of chemicals in accordance with the risks as described in the material data sheets. • Keep a stock inventory register of all chemicals in the store. • Powders must be stored above liquids. • Proper storage of chemicals in a lockable, well ventilated building. • Ensure adequate access control for the storage area. • Storage areas for hazardous chemicals are to comply with standard fire safety regulations. • Safety signage including “No Smoking”, “No Naked Lights” and “Danger”, and product identification signs, are to be clearly displayed in areas housing chemicals. • Appropriate equipment to deal with emergency spill incidents is to be readily available on site. This includes fire extinguishers, spill kits for hydrocarbon spills, drip trays for equipment and/or machinery leaks, drums or containers for contaminated water. • Chemicals are to be properly labelled and handled in a safety conscious manner. • All personnel handling hazardous chemicals and hazardous materials are to be issued with the appropriate Personal Protective Equipment (PPE). • Ensure that diesel, fuel and/or oil tanks are in a bunded area with capacity of holding 110% of the total storage volume. • The removal of only the daily-required amount of chemicals to be used from the shed. • If refuelling on site or from drums, the ground must 	<p>During the construction phase.</p> <ul style="list-style-type: none"> • Construction contractor • ECO 	2	2	L	<ul style="list-style-type: none"> • NEMA, 1998 	



				<p>be protected and proper dispensing equipment is to be used i.e. hand pumps and funnels. Drums may not be tipped to dispense fuel.</p> <ul style="list-style-type: none"> • Use of drip trays during filling of machinery or equipment. Drip trays should be emptied into secondary containers on a regular basis. • Ensure that any spilled chemicals cannot exit the designated storage area by constructing a berm or bump at the exit, or store chemicals in a spill tray. • Immediately clean all spillage of fuels, lubricants and other petroleum based products. • The contaminated material must be disposed of in accordance with the waste management procedure. • No hazardous chemicals must be discarded in the sewage or stormwater system. • Soil contaminated with hazardous chemical substances shall be treated as hazardous waste and removed from site. 						
Soil, stormwater and groundwater pollution due to poor waste management. Nuisance caused by odours and unsightly appearance of waste onsite.	4	2	M	<p>To prevent soil, stormwater and groundwater pollution and nuisance due to poor waste management.</p> <ul style="list-style-type: none"> • Building and demolition waste must be disposed of at a licensed landfill site. Steel should be taken to a licensed recycling facility. • The management of waste must be in accordance with the stipulations of the municipal Solid Waste By-law (2013). • Installation of sufficient waste bins, skips or bulk containers. Containers must be present on site at all times. • All containers (bins, skips or bulk containers) shall be kept in a clean and hygienic manner. • Containers (bins, skips or bulk containers) utilised for the disposal of general and hazardous waste must be demarcated accordingly. • Waste material may only be temporarily stored at areas demarcated for such storage practices. • General waste shall be stored in a manner that prevents the harbouring of pests. • General waste material should always be stored or disposed of separately from hazardous waste material (e.g. oil, diesel). • General and hazardous waste can be deposited into appropriately demarcated bins at the construction areas. Bins must then be emptied into appropriately demarcated skips or bulk containers at the end of each day or more often if required. • Skips or bulk containers should be removed to a licensed landfill site on a weekly basis or more often if required. • No littering is permitted and site clean-ups must regularly be undertaken. 	During the construction phase.	<ul style="list-style-type: none"> • Construction contractor • ECO 	2	2	L	<ul style="list-style-type: none"> • NEMA, 1998 • NEM:WA, 2008 • Moses Kotane Local Municipality Solid Waste By-law, 2013



<p>Soil, stormwater and groundwater pollution from unsanitary conditions onsite.</p>	<p>3</p>	<p>3</p>	<p>M</p>	<p>To prevent soil, stormwater and groundwater pollution from unsanitary conditions onsite.</p>	<ul style="list-style-type: none"> • Sufficient ablution facilities shall be provided – minimum of 1 toilet per 15 workers. • The ablution facilities must be on impermeable surfaces. Functional, existing ablution facilities can be used. • The location of chemical toilets is to be approved by the ECO prior to site establishment, but shall be located within 100m of any work point. • Ablating anywhere other than in the toilets shall not be allowed. • Temporary ablution facilities are to be secured to prevent them from blowing or falling over. • The contractor shall ensure that any chemicals and/or waste from the ablution facilities is not spilled on the ground at any time. • Ablution facilities are to be serviced weekly or more frequently if required. • The contractor is to ensure that no spillage occurs and that the contents are removed from site on a regular basis. • Toilet paper must be provided at all times. 	<p>During the construction phase.</p>	<ul style="list-style-type: none"> • Construction contractor • ECO 	<p>1</p>	<p>2</p>	<p>L</p>	<ul style="list-style-type: none"> • NEMA, 1998 • Water and Sanitation By-laws, 2008
<p>Soil and water pollution as a result of contaminated wash water entering the environment.</p>	<p>3</p>	<p>3</p>	<p>M</p>	<p>To prevent the pollution of soil, stormwater and groundwater through contaminated wash water. An example of this would be water that is contaminated with cement or concrete.</p>	<ul style="list-style-type: none"> • No washing of vehicles is permitted on site. • A dedicated temporary cleaning area is to be identified to facilitate washing of all cement equipment. The cleaning area could be a plastic lined cleaning pit or dedicated plastic or metal drums, located as close as possible to a water point. • No wastewater/wash water may be disposed of on site, onto the soil or into any water body. • Runoff from washing activities is to be contained by berms or trenches. 	<p>During the construction phase.</p>	<ul style="list-style-type: none"> • Construction contractor • ECO 	<p>2</p>	<p>2</p>	<p>L</p>	<ul style="list-style-type: none"> • NEMA, 1998
<p>Hydrocarbon pollution of soil, stormwater and groundwater due to the fuel-, grease- or oil spillages or leaking equipment and vehicles.</p>	<p>3</p>	<p>3</p>	<p>M</p>	<p>To prevent hydrocarbon pollution of soil, stormwater and groundwater through the spilling of fuel, grease or oil or leaking equipment and vehicles.</p>	<ul style="list-style-type: none"> • Equipment and vehicles are to be repaired immediately upon developing leaks. • Drip trays shall be supplied for all repair work undertaken on machinery on site. • Drip trays are to be utilised during greasing and re-fuelling of machinery and to contain incidental spills and pollutants. • Drip trays are to be inspected daily for leaks and effectiveness and emptied when necessary. This is to be closely monitored during rain events to prevent overflow. • Appropriate equipment to deal with emergency spill incidents is to be readily available on site. This includes fire extinguishers, spill kits for hydrocarbon spills, drip trays for equipment and/or machinery leaks and drums or containers for contaminated water. • Soil contaminated with hazardous substances, fuel 	<p>During the construction phase.</p>	<ul style="list-style-type: none"> • Construction contractor • ECO 	<p>2</p>	<p>2</p>	<p>L</p>	<ul style="list-style-type: none"> • NEMA, 1998



				<p>or oil shall be treated as hazardous waste and removed from site.</p> <ul style="list-style-type: none"> • If refuelling on site or from drums, the ground must be protected and proper dispensing equipment is to be used i.e. hand pumps and funnels. Drums may not be tipped to dispense fuel. • All liquid fuels (petrol and diesel) are to be stored in tanks or containers with lids. • Inspect vehicles on entering the construction site to ensure that they are in sound condition to reduce the risk of oil or diesel spillages. 							
Operational Phase											
Soil, stormwater and groundwater pollution due to poor management and accidental spills of hazardous chemical substances including fuel, greases and oils used during operational activities.	4	4	H	To prevent and minimise soil, stormwater and groundwater pollution as a result of poor management and accidental spills of hazardous chemical substances including fuel, greases and oils used onsite.	Apply the same mitigation measures as for the construction phase.	Life of operation	Facility Manager	3	3	M	<ul style="list-style-type: none"> • NEMA, 1998
Soil, stormwater and groundwater pollution due to poor waste management during operational activities. Nuisance caused by odours and unsightly appearance of waste onsite. Domestic waste will be removed from site by the municipal waste removal service.	3	3	M	To prevent and minimise soil, stormwater and groundwater pollution and nuisance due to poor waste management.	<ul style="list-style-type: none"> • The Waste Tyre Pyrolysis Plant must obtain a Waste Management Licence for activities that will be triggered at the proposed facility in terms of Government Notice No. 921 of 29 November 2013 (in terms of the National Environmental Management: Waste Act, 2008). • The management of waste must be in accordance with the stipulations of the municipal Solid Waste By-law (2013). • The Waste Tyre Pyrolysis Plant must be registered on the South African Waste Information System. • All waste storage containers must comply with the conditions as stipulated in GNR. 926 of 29 November 2013. • Training must be provided continuously to employees working with waste. The training programme must include the provisions stipulated in GNR. 926 of 29 November 2013. • An Emergency Preparedness Plan must be compiled in accordance with GNR. 926 of 29 November 2013. • Monitoring, auditing, reporting and record keeping must be conducted in accordance with GNR. 926 of 29 November 2013. • Domestic waste must be removed from site on a weekly basis by the municipal waste removal service. If waste is not removed by the municipality, the facility manager must ensure that the domestic waste is removed to a licensed waste disposal site on a weekly basis. 	Life of operation	Facility Manager	2	2	L	<ul style="list-style-type: none"> • NEMA, 1998 • NEM:WA, 2008 • Moses Kotane Local Municipality Solid Waste By-law, 2013

				<ul style="list-style-type: none"> • Should any of the char need to be disposed of, it must be taken to a suitable, licensed landfill site. The char must be transported in sealed plastic bags. • Any of the products from the pyrolysis process (char, Carbon Black, fibres, pyrolysis oil and/or steel) that cannot be sold or re-used or processed further must be considered waste and disposed accordingly at a licensed landfill site (California Integrated Waste Management Board, 1995). • The Waste Classification and Management Regulations, 2013, and the National Norms and Standards for Disposal of Waste to Landfill, 2013, must be used to determine to which type of landfill a particular waste stream must be sent for disposal. • No littering is permitted and site clean-ups must regularly be undertaken. 						
Soil, stormwater and groundwater pollution from unsanitary conditions onsite during operational activities.	3	3	M	To prevent soil, stormwater and groundwater pollution from unsanitary conditions onsite. <ul style="list-style-type: none"> • Sufficient ablution facilities shall be provided – minimum of 1 toilet per 15 workers. • Functional, existing ablution facilities can be used. • Ablating anywhere other than in the toilets shall not be allowed. • Ablution facilities are to be serviced weekly or more frequently if required. • Toilet paper must be provided at all times. 	Life of operation	Facility Manager	2	2	L	<ul style="list-style-type: none"> • NEMA, 1998 • Water and Sanitation By-laws, 2008
Soil, stormwater and groundwater pollution as a result of contaminated wash water entering the environment during operational activities. Wash water will be generated when the waste tyres are cleaned prior to them being taken to the shredder. Rain water will also wash dirt and road oil from the tyres and this may result in contaminated stormwater runoff.	3	3	M	To prevent soil, stormwater and groundwater pollution by contaminated wash water. <ul style="list-style-type: none"> • Cleaning the tyres using compressed air instead of water should be considered. • Water used for the washing of the incoming tyres should be used in a closed system, if possible. This will allow the re-use of water whilst also allowing the removal of oil and other particles from the water. The oil should be separated out and sent to a licensed oil recycling facility. Other debris or sludge should be disposed of at a licensed waste disposal site. • Wash water that cannot be re-used must also be disposed of at a licensed waste disposal site • Should it be desired for the tyre wash water to be discharged into the municipal sewage disposal system, permission must be obtained from the Moses Kotane Local Municipality in terms of Section 75 of the Water and Sanitation By-laws, 2008. • All the requirements and conditions contained in the Water and Sanitation By-laws, 2008, must be adhered to. • Subject to the above permission, the wash water must comply with the standards and criteria set out in Schedules “A” and “B” of the Water and Sanitation By-laws, 2008. Preliminary treatment may be required to ensure that these standards and 	Life of operation	Facility Manager	2	2	L	<ul style="list-style-type: none"> • NEMA, 1998 • Water and Sanitation By-laws, 2008



				<p>criteria are met.</p> <ul style="list-style-type: none"> • Subject to the above permission, the wash water entering the municipal sewage disposal system must comply with the following, unless otherwise authorised by the authorised official: <ul style="list-style-type: none"> ▪ It may not have a temperature exceeding 45°C or 10°C above ambient temperature, whichever is higher at the point of entry to the sewer. ▪ It may not have a pH of less than 6.0 or greater than 9.5. ▪ It may not contain the following: <ul style="list-style-type: none"> ❖ Calcium carbide or radioactive waste or isotope. ❖ Yeast, yeast waste, molasses (spent or unspent), in excess of the amount permitted by the authorised official. ❖ Cyanogen compounds capable of liberating hydrogen cyanide on acidification. ❖ Degreasing solvents, petroleum spirit, volatile inflammable solvents or any substance which may, or is likely to, give off an inflammable or poisonous vapour at a temperature above 20°C. ▪ It may not contain any matter in such concentrations as will, in the opinion of the authorised official, produce or is likely to produce in the final treated effluent at any sewage works or in any public water, any offensive or otherwise undesirable taste, odour, colour or any foam. ▪ It may not prejudice the reuse of treated sewage effluent for industrial or similar purposes or adversely affect any of the processes by which sewage is treated, or produce sludge for disposal. ▪ It may not contain any substance or material which is not amenable to treatment to a satisfactory degree at a sewage treatment works or which causes, or is likely to cause, breakdown or inhibition of the processes at such works. ▪ It may not contain any substance or thing which is of such strength, or which is amenable to treatment only to such a degree as will result in effluent from the treatment works being unable to comply satisfactorily with the requirements of the Water Act, 1998. ▪ It may not cause danger to health or safety of any person. It may not be injurious to the sewage disposal system nor may it prejudice the use of any ground by the Municipality for the sewage disposal system. • The wash water delivery pipeline into the municipal 				
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				<p>sewage disposal system must be maintained in a proper condition and free from leaks.</p> <ul style="list-style-type: none"> No wastewater/wash water may be disposed of on site, onto the soil or into any water body. Runoff from washing activities is to be contained by berms or trenches. No washing of vehicles is permitted on site. A dedicated cleaning area is to be identified to facilitate washing of all equipment. The cleaning area could be a plastic lined cleaning pit or dedicated plastic or metal drums, located as close as possible to a water point. 						
Soil and groundwater pollution from leaking or broken sewerage pipes.	3	3	M	<p>To prevent soil, stormwater and groundwater pollution from leaking or broken sewerage pipes.</p> <ul style="list-style-type: none"> Ablution facilities should be maintained to prevent or minimise blockage and leakages. Should toilets become blocked or run slowly, this should be reported and the cause investigated. This could be due to a blocked or broken pipe leading from the toilets to the sewerage system. Create employee awareness about the proper use of ablution facilities and the importance of proper hygiene. No cigarette butts, fats, oils, paper towels etc. may be disposed of into toilets or wash basins. Toilets should have properly closing doors and be supplied with toilet paper. 	Life of operation	Facility Manager	1	3	L	<ul style="list-style-type: none"> NEMA, 1998
Contamination of clean stormwater runoff when the water runs through "dirty" areas on the site.	4	3	H	<p>To ensure adequate stormwater management and to prevent the contamination of clean stormwater.</p> <ul style="list-style-type: none"> The site must have an adequate and effective stormwater management system in place. No hazardous chemicals or waste may be discarded in the stormwater system. Clean stormwater runoff from the surrounding environment must be channelled away from 'dirty' areas. These 'dirty' areas include the tyre storage area, buildings on site as well as any other product or waste storage areas. Where necessary, place culverts underneath road foundations. 	Life of operation	Facility Manager	2	2	L	<ul style="list-style-type: none"> NEMA, 1998
<p>Incorrect storage of waste tyres and shredded tyres resulting in soil, stormwater and groundwater pollution.</p> <p>Stored tyres (whole or in pieces) may leach substances into the soil if the tyres are stored on bare ground (California Integrated Waste Management Board, 1995).</p> <p>Should a fire become established at the waste tyre storage area, the burning tyres would decompose into the following:</p> <ul style="list-style-type: none"> Ash (typically containing carbon, zinc oxide, titanium dioxide, silicon dioxides); Sulphur compounds such as carbon disulfide, sulphur dioxide, hydrogen sulphide; Polynuclear aromatic hydrocarbons such as 	3	4	H	<p>To ensure that the waste tyres are stored in the correct manner so as to prevent environmental pollution, due to, for example, the release of oil from burning tyres.</p> <ul style="list-style-type: none"> The waste tyre storage area must have an impermeable surface, such as a concrete slab. The waste tyres must be stored in accordance with the stipulations in GNR. 926 of 29 November 2013. The waste tyre storage facility must be registered within the competent authority within 90 days prior to the construction phase commencing. The waste tyre storage facility must be designed in accordance with the stipulations in GNR. 926 of 29 November 2013. The waste tyre storage facility must have correct access control and signage as stipulated in GNR. 926 of 29 November 2013. The waste tyre storage facility must be operated as 	Life of operation	Facility Manager	2	2	L	<ul style="list-style-type: none"> NEMA, 1998 NEM:WA, 2008 Waste Tyre Regulations, 2009



<p>benzo(a)pyrene, chrysene, benzo(a)anthracene, etc.) in the oil that is produced;</p> <ul style="list-style-type: none"> • Aromatic-, naphthenic- and paraffinic oils; • Particulates; • Various light-end aromatic hydrocarbons, such as toluene, xylene and benzene; and • Oxides of nitrogen and carbon (www.mfe.gov.nz). <p>The oily runoff can be carried by water, if water is used to extinguish the fire, or by rainwater. It is estimated that the average passenger car tyre produces 7.8 litres of oil (www.epa.gov). Immediate soil pollution will be caused when the liquid decomposition products penetrate the soil. Gradual pollution of the deeper soil horizons and groundwater can also result from the leaching of ash and unburnt residues after rain events (www.mfe.gov.nz).</p> <p>The waste tyres will be stored in an area of up to 4 800m² prior to their processing in the pyrolysis plant.</p>				<p>stipulated in GNR. 926 of 29 November 2013.</p> <ul style="list-style-type: none"> • In accordance with the Waste Tyre Regulations (2009), the waste tyre storage area may not exceed 30 000m². • A waste tyre storage area plan must be developed. The plan must be approved by the municipal fire department and must be available onsite at all times. • The site must have clearly visible signs posted near the entrance of the facility. The signs must show the operating hours, contact details and site regulations. • A security attendant trained in fire prevention must be on site at all times. • The site manager must be on site at all times (when the facility is open/operational). • No single pile of waste tyres may exceed a height of 3 metres, a length of 20 metres or a width of 10 metres. • All interior firebreaks between the waste tyre piles must be at least five metres wide. • The storage area must be flat and hard packed. • The site must make provision for storm water management. • The edges of the waste tyre piles must be at least 8 metres from the perimeter fence and any buildings. The area between the piles and the fence and buildings must be clear of debris and vegetation. • All firebreaks must be at least 8 metres wide. • Waste tyre piles may not be located within 8 metres from a power line. • The following diagram gives an example of the correct waste tyre storage area design. <div data-bbox="1320 1302 1774 1690" data-label="Diagram"> </div> <ul style="list-style-type: none"> • The waste tyres must not be stored on steeply graded surfaces or anywhere else where they may pose a significant environmental or fire risk. • The stormwater system at the site must ensure that water runoff from the waste tyre storage area is contained. This will ensure that runoff water 				
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				contaminated by oil from the burning of the tyres can be contained.							
The inadequate storage of pyrolysis oil, such as on a permeable surface, together with the possibility of storage tank failure can lead to pollution of the soil, stormwater and groundwater. Such pollution can also be caused due to the incorrect storage of steel and Carbon black.	4	3	H	To ensure that the pyrolysis oil, steel and Carbon black is stored in a safe and responsible manner.	<ul style="list-style-type: none"> The purified oil must be stored in suitably designed storage tanks, contained within an impermeable bund area. The bund area must be capable of containing a volume not less than the greatest amount of product (oil) that can be released from the largest tank. The capacity of the bunded area must be calculated after the volume of the other tanks below the bund wall (excluding the largest tank), has been deducted. The oil storage tanks must comply with SANS 10089-1:2008 (The Petroleum Industry Part 1: Storage and distribution of petroleum products in above-ground bulk installations). All tanks must be labelled to show their composition and tank capacity. Bund walls must be labelled to show their capacity. The bund area must be equipped with an operational sump and pump system to collect any oil that may spill. The bunded area must have adequate firefighting equipment installed to the satisfaction of the local authorities. The steel that is removed from the tyres must be stored in containers prior to its removal off site. The produced Carbon black must be stored in impermeable, sealable bags within the designated storage building. 	Life of operation	Facility Manager	2	2	L	<ul style="list-style-type: none"> NEMA, 1998
Inadequate storage of ash may result in the leaching of zinc and sulphur when rain water infiltrates through the ash. According to the available information, no ash will be generated from the process under normal operating conditions. Ash will be formed under abnormal conditions where air creeps into the processing chamber. The ash will only be formed when combustion is taking place, but the process is specifically designed to not allow combustion to occur.	3	3	M	To prevent the inadequate storage of ash that may be generated under abnormal conditions.	<ul style="list-style-type: none"> No ash may be stored in the open. Ash must be stored in impermeable, sealable bags within the designated storage building and disposed of at a licensed hazardous landfill site. The ash must be transported in sealed plastic bags. 	Life of operation	Facility Manager	1	3	L	<ul style="list-style-type: none"> NEMA, 1998
Decommissioning Phase											
Closure and decommissioning of the pyrolysis plant is not anticipated for the foreseeable future. Should the facility close, a detailed closure and rehabilitation plan will be submitted to the North West Department of Rural, Environmental and Agricultural Development prior to decommissioning.	N/A										

Table 31: Environmental impact assessment: Resources

Activity:



- Construction activities, repair activities and the installation and assembly of the Waste Tyre Pyrolysis Plant.
- Operation of the Waste Tyre Pyrolysis Plant.

Aspect:

Construction Phase

- Inefficient and redundant use of valuable resources.

Operational Phase

- Leaking or broken water storage vessels.
- Leaking or broken water pipelines.
- Inefficient or ineffective operation of the backup generator.
- Inefficient or ineffective operation of the Waste Tyre Pyrolysis plant.

Nature and significance of environmental impact

Impact Description	Risk rating (before mitigation)			Environmental Objective	Management / Mitigation / Monitoring Measures	Timeframe	Responsibility	Risk rating (after mitigation)			Applicable legislation / other documents
	Probability	Magnitude	Severity					Probability	Magnitude	Severity	
Construction Phase											
Wastage or depletion of valuable resources like water and electricity due to inefficient or redundant usage. Water and electricity will be obtained from the municipality using existing bulk service connections to the site.	3	2	M	To prevent the wastage or depletion of valuable resources.	<p>General</p> <ul style="list-style-type: none"> • Ensure that all employees have been informed of the importance of natural resources (proper environmental training and awareness). • Regular site inspection by supervisors. <p>Water</p> <ul style="list-style-type: none"> • Regular inspection and maintenance of all water tanks, toilets, water pipes and taps. • Leaking tanks, taps, toilets and pipes are to be repaired immediately. • Running water taps and pipes may not be left unattended. • All pipe, hose and tap connections are to be fitted with correct and appropriate plumbing fittings. 	During the construction phase.	<ul style="list-style-type: none"> • Construction contractor • ECO 	2	2	L	<ul style="list-style-type: none"> • NEMA, 1998 • NWA, 1998
Operational Phase											
Wastage or depletion of water from the municipal water supply due to leaking or broken water pipelines and water storage vessels.	3	2	M	To prevent the wastage or depletion of a valuable resource.	<ul style="list-style-type: none"> • Ensure that all employees have been informed of the importance of natural resources (proper environmental training and awareness). • Regular site inspection by supervisors. • Regular maintenance and inspection of the municipal water supply pipeline(s) to the site. • Monitoring of resource consumption to detect leakages as soon as possible. • Integrity tests must be conducted on water storage vessels as stipulated by the suppliers. 	Life of operation	Facility Manager	2	2	L	<ul style="list-style-type: none"> • NEMA, 1998 • NWA, 1998



Inefficient or ineffective operation of the backup generator. This may lead to higher diesel usage should the generator not operate efficiently and can also result in more breakages than normal.	3	3	M	To ensure the efficient, long-term operation of the backup generator.	<ul style="list-style-type: none"> Ensure that the generator is correctly maintained as stipulated by the manufacturer and repaired when required. Optimal combustion will allow for 'cleaner' emissions. Limit unnecessary idling of the generator. Only use the generator when required and use it as prescribed by the manufacturer. 	Life of operation	Facility Manager	2	2	L	<ul style="list-style-type: none"> NEMA, 1998
Wastage or depletion of valuable resources, such as LPG and water, due to inefficient or ineffective operation of the Waste Tyre Pyrolysis plant.	3	2	M	To ensure efficient operation of the Waste Tyre Pyrolysis plant so that resources are used optimally.	<ul style="list-style-type: none"> The pyro-gas from the pyrolysis process must burn to provide energy for the pyrolysis process. Process Char into Carbon Black. Water used for the washing of the incoming tyres should be used in a closed system, if possible. This will allow the re-use of water. Cleaning the tyres using compressed air instead of water should be considered. The metal that is separated from the waste tyres must be recycled. 	Life of operation	Facility Manager	2	2	L	<ul style="list-style-type: none"> NEMA, 1998
Decommissioning Phase											
Closure and decommissioning of the pyrolysis plant is not anticipated for the foreseeable future. Should the facility close, a detailed closure and rehabilitation plan will be submitted to the North West Department of Rural, Environmental and Agricultural Development prior to decommissioning.	N/A										

Table 32: Environmental impact assessment: Workers' safety

Activity:							
<ul style="list-style-type: none"> Construction activities, repair activities and the installation and assembly of the Waste Tyre Pyrolysis Plant. Operation of the Waste Tyre Pyrolysis Plant. 							
Aspect:							
<u>Construction Phase</u>							
<ul style="list-style-type: none"> Inadequate training of employees or contractors on risks associated with construction activities. Safety hazards may occur if equipment is not handled in the correct manner. Employees not receiving the correct PPE for their specific responsibilities. Employees not adhering to safety rules implemented at the site. Construction of the LPG storage tank. Construction of the pyrolysis oil storage tank(s). 							
<u>Operational Phase</u>							
<ul style="list-style-type: none"> Inadequate training of employees or contractors on risks associated with operational activities. Safety hazards may occur if equipment is not handled in the correct manner. Employees not receiving the correct PPE for their specific responsibilities. Employees not adhering to safety rules implemented at the site. Storage of LPG on site. Storage of pyrolysis oil on site. 							
Nature and significance of environmental impact							
Impact Description	Risk rating (before mitigation)	Environmental Objective	Management / Mitigation / Monitoring Measures	Timeframe	Responsibility	Risk rating (after mitigation)	Applicable legislation / other documents

	Probability	Magnitude	Severity					Probability	Magnitude	Severity	
Construction Phase											
Injury of employees and contractors working on site during the construction phase.	3	3	M	To ensure that contractors work in a safe working environment and are not injured.	<ul style="list-style-type: none"> An emergency procedure, taking into consideration all potential emergencies, such as a fire outbreak, hazardous chemical spill, etc. should be compiled. The contractor is to ensure that all employees, including sub-contractors and their employees, are trained on the emergency procedure. Follow-up emergency training may be required from time to time as new subcontractors or crews commence work. The contractor is to maintain accurate records of any emergency training undertaken. 	During the construction phase.	<ul style="list-style-type: none"> Construction contractor ECO 	2	2	L	<ul style="list-style-type: none"> NEMA, 1998 OHSA, 1993
Inadequate construction of the LPG storage tank can lead to failures during the operational phase.	3	3	M	To ensure that the LPG storage tank is constructed to the required specifications.	<ul style="list-style-type: none"> The LPG storage tank shall be constructed according to the stipulations of SANS 10087-3:2008 (The handling, storage, distribution and maintenance of liquefied petroleum gas in domestic, commercial and industrial installations). 	During the construction phase.	<ul style="list-style-type: none"> Construction contractor ECO 	1	3	L	<ul style="list-style-type: none"> NEMA, 1998
Inadequate construction of the pyrolysis oil storage tank(s) can lead to failures during the operational phase.	3	3	M	To ensure that the pyrolysis oil storage tank(s) is/are constructed to the required specifications.	<ul style="list-style-type: none"> The pyrolysis oil storage tank(s) shall be constructed according to the stipulations of SANS 10089-1:2008 (The Petroleum Industry Part 1: Storage and distribution of petroleum products in above-ground bulk installations). The storage tanks must be installed with minimum safety distances and levels of protection as stipulated in SANS 10089-1:2008 and must be arranged so that firefighting can be carried out effectively with mobile and stationary fire-fighting equipment. The pyrolysis oil storage tank or tanks must be adequately vented. Vent properties must be in accordance with SANS 10089-1:2008. All tanks must have approved emergency venting that will relieve excessive internal pressure in the event of fire exposure. The venting capacity shall be in accordance with an approved standard, such as API Std 2000. 	During the construction phase.	<ul style="list-style-type: none"> Construction contractor ECO 	1	3	L	<ul style="list-style-type: none"> NEMA, 1998
Operational Phase											
Injury of employees working on site during the operation of the Waste Tyre Pyrolysis Plant.	3	3	M	To ensure that employees and contractors work in a safe working environment and are not injured.	<ul style="list-style-type: none"> All employees must receive relevant, job-specific training and must be adequately qualified to work at the facility. All employees must be provided with the correct PPE for the work that they conduct. This includes, 	Life of operation	Facility Manager	2	2	L	<ul style="list-style-type: none"> NEMA, 1998 OHSA, 1993 Environmental Regulations for Workplaces, 1987

					<ul style="list-style-type: none"> for example, boots, overalls, masks and gloves. Clean overalls must be provided to workers on a daily basis. New masks must be provided on a daily basis if disposable masks are used. An emergency procedure, taking into consideration all potential emergencies, such as a fire outbreak, hazardous chemical spill, etc. should be compiled. All employees, including sub-contractors and their employees, must be trained on the emergency procedure. Follow-up emergency training may be required from time to time as new subcontractors or crews commence work. The facility manager is to maintain accurate records of any emergency training undertaken. Suitable sensors must be installed for gas, temperature and pressure within the Waste Tyre Pyrolysis Plant. The sensors will ensure that products are only removed from vessels when it is safe to do so. A safety valve must be installed to release any excess pressure build-up within the reactor vessel. A Carbon monoxide (CO) sensor and alarm system must be installed within the main working area so that workers can be alerted should the CO concentrations exceed safe limits. The requirements of the Environmental Regulations for Workplaces, 1987, must be adhered to. 						
<p>The incorrect storage of LPG may lead to explosions, fires and harm to employees. The gas is stored as liquid under pressure. Leakages, especially of the liquid, will release large volumes of highly flammable gas. Ignition will result in a rate of combustion of near-explosive force. LPG is non-toxic, but it can induce headaches and dizziness and may cause cancer and genetic defects by inhalation if 1,3-butadiene is a component.</p> <p>According to the SDS, LPG is inherently biodegradable and accumulation in terrestrial organisms is unlikely. It is not expected to be harmful to aquatic organisms. Liquid release is only expected to cause localised, non-persistent environmental damage, such as freezing.</p> <p>Biodegradation of LPG may occur in soil and water. Volatilisation is expected to be the most important removal process in soil and water. LPG is expected to exist entirely in</p>	3	4	H	To ensure that the LPG is stored in a safe and responsible manner.	<ul style="list-style-type: none"> A copy of the Safety Data Sheet (SDS) for LPG must be kept on site and the provisions in the SDS followed. No smoking may take place in the vicinity of the LPG storage tank and signage indicating "No Smoking" must be displayed. Open flames, hot surfaces, heat and sparks must be kept away from the LPG storage tank and signage indicating the before mentioned must be displayed. Employees must avoid breathing in the gas. Employees must wear protective clothing such as goggles, gloves and face shields, to prevent eye, skin and face contact. Protect the LPG storage tank from sunlight and place it in a secure or locked up location that is well ventilated. 	Life of operation	Facility Manager	2	3	M	<ul style="list-style-type: none"> NEMA, 1998 OHSA, 1993

the vapour phase in ambient air.					<ul style="list-style-type: none"> Adequate firefighting equipment must be kept at the LPG storage tank. Use a suitable extinguishing media. 						
The incorrect storage of the pyrolysis oil may lead to fires and harm to employees.	3	4	H	To ensure that the pyrolysis oil is stored in a safe and responsible manner.	<ul style="list-style-type: none"> Adequate firefighting equipment must be kept at the pyrolysis oil storage tank(s). Use a suitable extinguishing media. No smoking may take place in the vicinity of the storage tank(s) and signage indicating “No Smoking” must be displayed. Open flames, hot surfaces, heat and sparks must be kept away from the storage tank(s) and signage indicating the before mentioned must be displayed. Place the oil storage tank(s) in a secure or locked up location. 	Life of operation	Facility Manager	2	3	M	<ul style="list-style-type: none"> NEMA, 1998 OHSA, 1993
Decommissioning Phase											
Closure and decommissioning of the pyrolysis plant is not anticipated for the foreseeable future. Should the facility close, a detailed closure and rehabilitation plan will be submitted to the North West Department of Rural, Environmental and Agricultural Development prior to decommissioning.	N/A										

Table 33: Environmental impact assessment: Heritage

Activity:											
<ul style="list-style-type: none"> Construction activities, repair activities and the installation and assembly of the Waste Tyre Pyrolysis Plant. Operation of the Waste Tyre Pyrolysis Plant. 											
Aspect:											
<ul style="list-style-type: none"> Disturbance of artefacts or sites of cultural heritage (archaeological and historical) significance. 											
Nature and significance of environmental impact											
Impact Description	Risk rating (before mitigation)			Environmental Objective	Management / Mitigation / Monitoring Measures	Timeframe	Responsibility	Risk rating (after mitigation)			Applicable legislation / other documents
	Probability	Magnitude	Severity					Probability	Magnitude	Severity	
Construction Phase											
Construction activities may disturb or destroy sites, features or artefacts of archaeological and/or historical importance. As the open space on site which will be disturbed by the proposed development is less than 5 000m ² , a Heritage Impact Assessment has not been done. The property is zoned for Industrial Land Use and is in a disturbed state. For this reason, it is expected that the impact on any heritage	1	3	L	To protect artefacts or sites of cultural heritage (archaeological and historical) significance.	If during any construction activities, any sites, features and objects of a cultural heritage (archaeological or historical) nature are exposed, an expert should be called in to investigate and suitable mitigation measures must be implemented. All activities in the area should be halted until the situation has been resolved.	During the construction phase.	<ul style="list-style-type: none"> Construction contractor ECO 	1	2	L	<ul style="list-style-type: none"> NEMA, 1998 NHRA, 1999



resources would be low. To date, no comments have been received from the South African Heritage Resources Agency.											
Operational Phase											
Operational activities may disturb or destroy sites, features or artefacts of archaeological and/or historical importance. The property is zoned for Industrial Land Use and is in a disturbed state. For this reason, it is expected that the impact on any heritage resources would be low. To date, no comments have been received from the South African Heritage Resources Agency.	1	3	L	To protect artefacts or sites of cultural heritage (archaeological and historical) significance.	If during any operational activities, any sites, features and objects of a cultural heritage (archaeological or historical) nature are exposed, an expert should be called in to investigate and suitable mitigation measures must be implemented. All activities in the area should be halted until the situation has been resolved.	Life of operation	Facility Manager	1	2	L	<ul style="list-style-type: none"> NEMA, 1998 NHRA, 1999
Decommissioning Phase											
Closure and decommissioning of the pyrolysis plant is not anticipated for the foreseeable future. Should the facility close, a detailed closure and rehabilitation plan will be submitted to the North West Department of Rural, Environmental and Agricultural Development prior to decommissioning.	N/A										

Table 34: Environmental impact assessment: Infrastructure

Activity:											
<ul style="list-style-type: none"> Construction activities, repair activities and the installation and assembly of the Waste Tyre Pyrolysis Plant. Operation of the Waste Tyre Pyrolysis Plant. 											
Aspect:											
<ul style="list-style-type: none"> Wear of access roads and insufficient vehicle inspections. 											
Nature and significance of environmental impact											
Impact Description	Risk rating (before mitigation)			Environmental Objective	Management / Mitigation / Monitoring Measures	Timeframe	Responsibility	Risk rating (after mitigation)			Applicable legislation / other documents
	Probability	Magnitude	Severity					Probability	Magnitude	Severity	
Construction Phase											
Wear of access roads, accidents on access roads, unpermitted transport of materials and/or loss of materials being transported on access roads.	4	2	M	To minimise the impact of an increase of traffic on access roads to the construction site.	<ul style="list-style-type: none"> Ensure that all vehicles using access roads are roadworthy. All loads are to be securely fastened when being transported. All vehicles are to adhere to the tonnage limitation and acquire a permit as required. All speed limits and other traffic regulations on the public roadways must be adhered to. 	During the construction phase.	<ul style="list-style-type: none"> Construction contractor ECO 	2	2	L	<ul style="list-style-type: none"> NEMA, 1998
Operational Phase											
Wear of access roads, accidents on access roads, unpermitted transport of materials and/or loss of materials	4	2	M	To minimise the impact of an increase of traffic on access roads	<ul style="list-style-type: none"> Apply the same mitigation measures as for the construction phase. 	Life of operation	Facility Manager	2	2	L	<ul style="list-style-type: none"> NEMA, 1998

being transported on access roads.				to the Waste Tyre Pyrolysis Plant.							
Decommissioning Phase											
<p>Closure and decommissioning of the pyrolysis plant is not anticipated for the foreseeable future. Should the facility close, a detailed closure and rehabilitation plan will be submitted to the North West Department of Rural, Environmental and Agricultural Development prior to decommissioning.</p>	<p>N/A</p>										



Refer to Part 8 below for a summary on the key findings related to the Waste Tyre Pyrolysis Plant and its associated infrastructure.

7.3.6 Cumulative Impacts

Cumulative impacts refer to the situation where an activity may in itself not have a significant impact, but may become significant when added to the existing and potential impacts from similar or different activities in the area. The following potential cumulative impacts have been identified:

Table 35: Cumulative impacts

Impact: Air pollution and nuisance (generation of air emissions)	
Contributing aspects	Atmospheric emissions generated at the proposed pyrolysis plant will add to atmospheric emissions released by all other sources within the municipal area and beyond. The combined release of atmospheric emissions within the Bojanala Platinum District Municipality and the Waterberg District Municipality is governed in terms of the Waterberg-Bojanala National Air Shed Priority Area's Air Quality Management Plan
Impact: Environmental Noise	
Contributing aspects	Noise generated at the proposed pyrolysis plant will add to existing noise levels as generated by the other industries within the Bodirelo Industrial Site, Mogwase



8. ENVIRONMENTAL IMPACT STATEMENT

8.1 Summary of key findings

This application for a Waste Management Licence in terms of the National Environmental Management: Waste Act, 2008, has been initiated to allow the construction and operation of the Vaporox Waste Tyre Pyrolysis Plant to be licensed in terms of the required environmental legislation.

The above mentioned licence will allow the plant to operate in a legally compliant manner in terms of the relevant environmental legislation in South Africa.

The following main negative impacts may arise from the proposed activity:

- Soil, stormwater and groundwater pollution;
- Nuisance due to noise and dust generation; and
- Harm to employees working at the pyrolysis plant.

8.2 Comparative assessment of positive and negative implications of the proposed activity and alternatives

Part 6 of this BAR contains a detailed investigation and assessment of the alternative options for the Waste Tyre Pyrolysis Plant activities. The positive and negative implications of each alternative are also described in Table 35 below. A comparison is done below to assess the positive and negative implications of the proposed activities compared with the no-go alternative. This should provide a fundamental consideration of the feasibility of the project.

Table 36: Comparison of the proposed preferred activities and the no-go option

	Positive Impacts	Negative Impacts/Aspects
Activity Alternative A1 – Retreading of tyres	<ul style="list-style-type: none"> • Retreading tyres allows the tyres to be re-used. 	<ul style="list-style-type: none"> • The quality of the retreaded tyres is not good.
Activity Alternative A2 – Re-use of tyres in other applications	<ul style="list-style-type: none"> • Mechanically or cryomechanically milled/ground up tyres can be re-used in other applications, such as for sport surfaces, carpets, playgrounds etc. If the rubber is ground up into a very fine powder, the powder can be used to reinforce new rubber products. 	<ul style="list-style-type: none"> • These processes have a high energy usage and there is a limited market for the products.
Activity Alternative A3 – Reclamation of	<ul style="list-style-type: none"> • The scrap tyres can be reclaimed. 	<ul style="list-style-type: none"> • The reclamation process is difficult and costly. The quality of the reclaimed rubber is also not high and the re-selling



	Positive Impacts	Negative Impacts/Aspects
tyres		of the reclaimed rubber as a raw material is therefore problematic.
Preferred Alternative: Activity Alternative A4 – Waste Tyre Pyrolysis	<ul style="list-style-type: none"> Pyrolysis is a viable option for the recycling or recovery of waste tyres and a number of pyrolysis plants are currently in operation worldwide. The existing, derelict buildings at the proposed site will be repaired and upgraded and this will improve the visual/aesthetic character of the property. The value of the proposed property will increase through the proposed development as the property is currently unused and the buildings are derelict. Safety on site will improve once the property has been developed and is in use. Employment opportunities will be created during the construction and operational phases of the project. Stimulation of the local, district and provincial economies. Infrastructure at the proposed site will be developed and improved. This includes bulk services' infrastructure. 	<ul style="list-style-type: none"> Atmospheric pollution from the Waste Tyre Pyrolysis plant and its associated processes. Noise pollution due to activities at the Waste Tyre Pyrolysis plant. The plant will, however, be situated within an existing Industrial area. Increased traffic will be generated to and from the site.
Location Alternative B1 – Developing an undeveloped site	<ul style="list-style-type: none"> No positive impacts could be identified. 	<ul style="list-style-type: none"> The purchase or renting and development of an undeveloped property would entail significant financial costs and is not economically feasible. Such an undeveloped site may also be located within a sensitive environment and fauna or flora of conservation concern could therefore be disturbed.
Preferred Alternative: Location Alternative B2 – Development of an existing site with suitable, existing	<ul style="list-style-type: none"> This location alternative is ideal as existing buildings and bulk service connections can be utilised. The financial costs are therefore less than developing an entirely new site. The proposed site is already in a disturbed state. 	<ul style="list-style-type: none"> Money will need to be spent to repair and upgrade the buildings and infrastructure at the proposed/preferred site. Money will need to be spent to install/construct the Waste Tyre Pyrolysis plant.

	Positive Impacts	Negative Impacts/Aspects
infrastructure		
Location Alternative B3 - Development of an existing site with unsuitable, existing infrastructure	<ul style="list-style-type: none"> No positive impacts could be identified. 	<ul style="list-style-type: none"> The purchase of a property with existing, but unsuitable infrastructure would be more costly than buying an undeveloped property. The purchase of a property with unsuitable, existing buildings would require these buildings to be demolished so that suitable buildings can be constructed. This would entail significant financial costs and is not economically feasible.
Site Layout Alternatives (C)	<ul style="list-style-type: none"> Limited site layout alternatives exist at the preferred site. Optimal use will be made of the existing buildings and open areas to accommodate the Waste Tyre Pyrolysis Plant and its associated infrastructure. 	
Process and Design Alternative	<ul style="list-style-type: none"> The applicant and Pyrolysis Plant manufacturer will consider all the applicable process and design alternatives and will design the plant and its processes for the optimal pyrolysis of the waste tyres. 	
No-Go Option	<ul style="list-style-type: none"> No atmospheric emissions will be released from the sites. No noise will be generated at the site. No additional traffic to and from the site will be generated. 	<ul style="list-style-type: none"> The existing, derelict buildings at the proposed site will not be repaired and will remain a visual/aesthetic nuisance to surrounding receptors. The value of the property will remain low if the site is not upgraded. The security on site will not improve as the site will remain vacant and derelict. No additional employment opportunities will be created and the local, district and provincial economies will not be stimulated.

As shown in the table above, the only viable Activity Alternative is Alternative A4 (Waste Tyre Pyrolysis), even though such a pyrolysis plant will have negative environmental impacts. The other activity alternatives are not viable as the processes are complicated, costly and do not have a proven market for their various products. In terms of the Location Alternatives, Alternative B2 (Development of an existing site with unsuitable, existing infrastructure) is the most viable option as this entails the least costs for the applicant in terms of developing a site for the pyrolysis plant. On the proposed site/property there are limited Site Layout Alternatives, but the existing buildings and open spaces are ideal for the pyrolysis operation that the applicant is proposing. The applicant and pyrolysis plant

manufacturer will consider the process and design options for the plant and the final designs will be optimal for the pyrolysis of the waste tyres. The No-Go Option will not have any environmental impacts, but keeping the site in its current, derelict state will also not contribute towards any new employment opportunities, stimulation of economies or improvements to the visual character of the site.



9. CONCLUSION

Information has been provided to the North West Department of Rural, Environmental and Agricultural Development and interested and affected parties during the Basic Assessment Phase. Comments and concerns were received and integrated into the Basic Assessment Report. This document serves as the draft report to be considered by the registered I&APs and state departments for a waste management licence. Should there be any comments received on this report within the notice period provided, these comments will be address in the final report that will be submitted to the competent authority, the North West Department of Rural, Environmental and Agricultural Development in this case, for final perusal.

This Basic Assessment process has been carried out in accordance with the NEMWA, 2008, NEMA, 1998, and the Regulations there under.

The positive and negative impacts of all the alternatives have been identified and assessed in Chapter 6. The pyrolysis of waste tyres has been identified as the only viable Activity Alternative, even though such a plant will result in negative environmental impacts. The identified impacts/environmental risks to the environment as a result of the proposed Waste Tyre Pyrolysis Plant are mostly **Medium**. The impacts can, however, be mitigated to mostly **Low**, provided that the draft Environmental Management Programme, containing all proposed mitigation measures, is implemented. It is further important that the EMP must be viewed as a dynamic, working document that will be improved upon as and when required.

The construction of the pyrolysis plant on a site with existing infrastructure and bulk services was found to be the most viable option for the client in terms of the financial costs associated with establishing a site for the proposed plant.

Positive impacts from the proposed project include the creation of new employment opportunities as well as the stimulation of local, district and provincial economies.

Based on the outcomes of the Environmental Impact Assessment, conducted as part of this Basic Assessment process, as well as the alternatives assessment, the following recommendations are made:

1. The proposed project/activity (the construction and operation of the Waste Tyre Pyrolysis Plant) should be authorised and allowed to proceed on the preferred site (25°16'12.40"; 27°16'25.36").
2. The mitigation measures proposed in this report and the draft Environmental Management Programme must be implemented during all phases of the proposed project.
3. It is assumed that the mitigation measures proposed in this report and the draft Environmental Management Programme will be correctly implemented by the applicant and that they will be effective.



4. A communications pathway must be established that would allow the designated ECO to accept and deal with stakeholder complaints.
5. Proposed mitigation measures should be incorporated as far as possible into the operational plan for the plant.
6. Strict monitoring and enforcement of requirements of the EMP must be undertaken to ensure that contractors and operators adhere to these requirements.

