



Vaporox (Pty) Ltd

Waste Tyre Pyrolysis Plant – draft Environmental Management Programme

Locality: Mogwase, North West Province

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

Date: 18 March 2015

SHANGONI
Management Services (Pty) Ltd



DRAFT ENVIRONMENTAL MANAGEMENT PROGRAMME (EMP)

Vaporox (Pty) Ltd

**Waste Tyre Pyrolysis Plant –
Draft Environmental Management
Programme**

Locality: Mogwase, North West Province

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

March 2015

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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 License Application

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

Compiled by: Karien du Plessis

Date: 18 March 2015

Location: Mogwase, North West Province

Technical Reviewer: Lizette Crous



Signature



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LIST OF 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

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1. INTRODUCTION

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, and use it for the development of a Waste Tyre Pyrolysis Plant.

Background description

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. 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.

Waste tyres will be delivered by truck, weighed and stockpiled outside. The tyres will then be cleaned and conveyed into the shredder to produce chips. Thereafter, the shredded tyres will be fed into the pyrolysis reactor vessel, which is devoid of oxygen. 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 includes steel, oil and char. 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 down. 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 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.

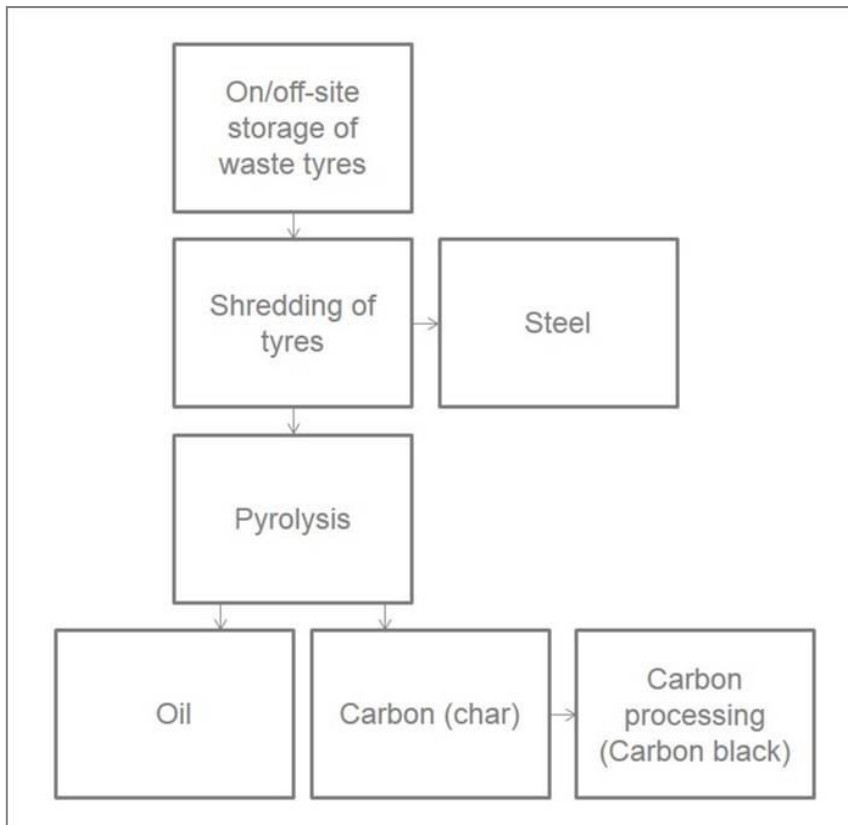


Figure 1: General pyrolysis process flow diagram

The following listed activities in terms of the National Environmental Management: Waste Act, 2008 (Act No. 59 of 2008) are being applied for:



Table 1: 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).



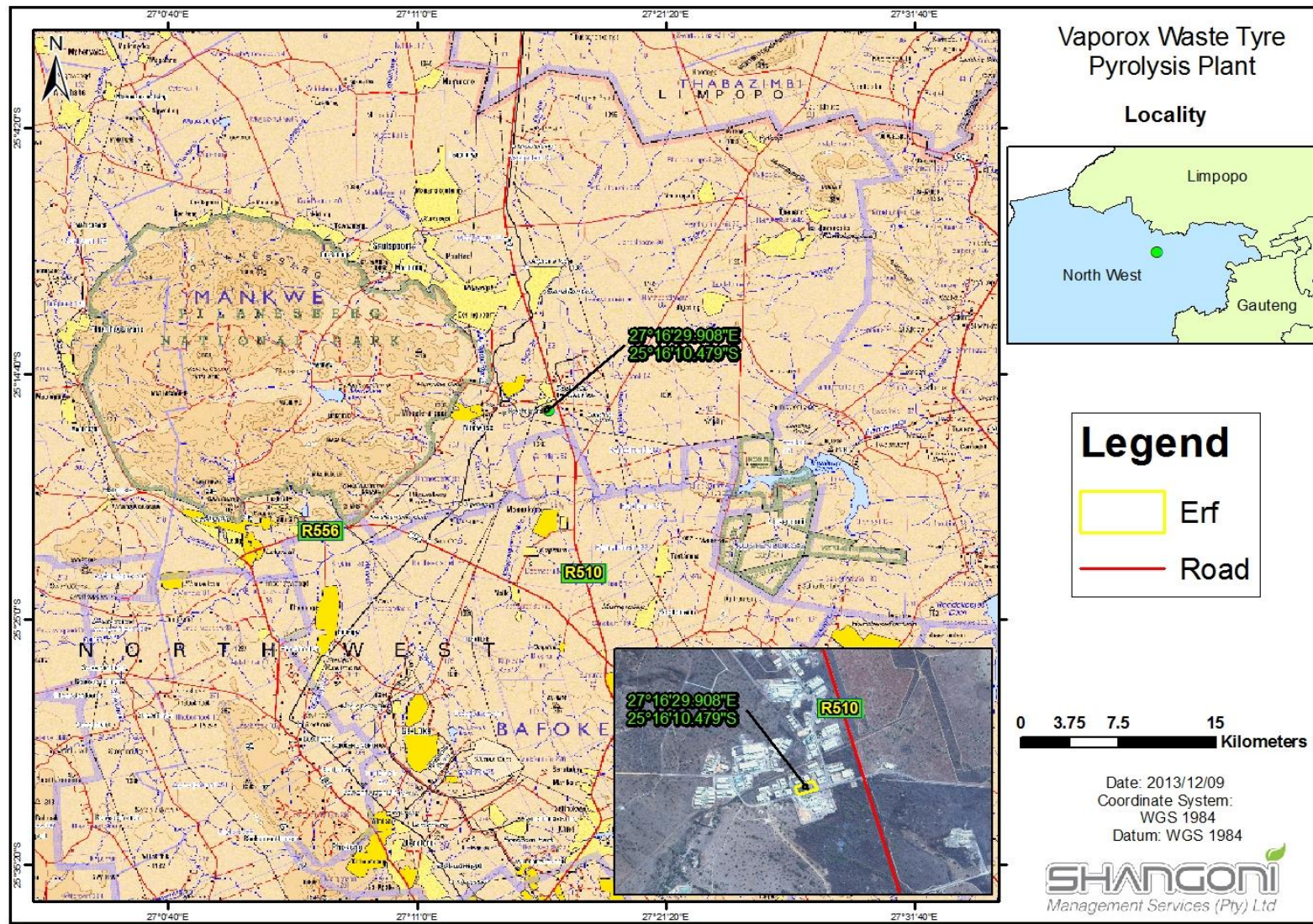


Figure 2: Site locality map

2. 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 (EAP) on project		
Name	Qualifications	Responsibility
Mr Lourens de Villiers	<ul style="list-style-type: none"> BSc. (Hons) (PU for CHE) MSc.(UP) More than 10 years' experience conducting Environmental Impact Assessments and Waste Management License Applications 	EIA Project Leader and Coordinator
Ms Lizette Crous	<ul style="list-style-type: none"> MSc. Environmental Management (University of London) More than 3 years' experience conducting Environmental Impact Assessments and Waste Management License Applications 	EAP
Ms Karien du Plessis	<ul style="list-style-type: none"> B.Sc. (Hons) Environmental Management More than three months' experience conducting Environmental Impact Assessments and Waste Management License Applications. 	Junior EAP

3. SITE DOCUMENTATION

The following documentation must be available at the site office at all times:

- A copy of the Basic Assessment (BA) Report;
- A copy of this Environmental Management Programme (EMP); and
- A copy of the Waste Management Licence.



4. LEGISLATION

Table 2: 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		
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



Title of legislation, policy or guideline	Administering authority	Aim of legislation, policy or guideline
		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 2004)	North West Department of Rural, Environmental and Agricultural Development	To provide for the management and conservation of South Africa’s biodiversity within the framework of the National Environmental Management Act, 1998.



Title of legislation, policy or guideline	Administering authority	Aim of legislation, policy or guideline
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 Act, 1998 (Act No. 107 of 1998).	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.



Title of legislation, policy or guideline	Administering authority	Aim of legislation, policy or guideline
National Environmental Management Amendment Act, 2008 (Act No. 62 of 2008).		
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.



5. ENVIRONMENTAL MANAGEMENT PROGRAMME

Refer to the tables below for the EMP. Responsibility is assigned to the relevant parties, keeping in mind that Vaporox (Pty) Ltd are ultimately still responsible for ensuring implementation of the EMP. The EMP must be updated should any significant changes occur to the operations at the Waste Tyre Pyrolysis Plant. The mitigation measures are set out in the tables below (per project phase), for the proposed waste tyre pyrolysis plant.

Note: Mitigation measures, as contained in the tables below, have taken the various alternatives into consideration.

5.1 SPECIFIC TRIGGERED LISTED ACTIVITY

5.1.1 Planning, Construction, Operational, Rehabilitation and Decommissioning Phases

Table 3: EMP – 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	Environmental Objective	Management / Mitigation Measures	Monitoring and Compliance Reporting	Timeframe	Responsibility
Planning and Design Phase					
<ul style="list-style-type: none"> 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 	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 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 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. 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 	Vaporox (Pty) Ltd must verify implementation of the mitigation measures proposed in this EMP.	Before construction commences	<ul style="list-style-type: none"> Vaporox (Pty) Ltd Plant designer



		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"> • Soil, stormwater or groundwater pollution due to the inadequate design of the pyrolysis oil, chemical and LPG storage vessels 	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). 	Vaporox (Pty) Ltd must verify implementation of the mitigation measures proposed in this EMP.	Before construction commences	<ul style="list-style-type: none"> • Vaporox (Pty) Ltd • Plant designer
<ul style="list-style-type: none"> • Soil erosion due to the inadequate design of the Waste Tyre Storage Area 	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. 	Vaporox (Pty) Ltd must verify implementation of the mitigation measures proposed in this EMP.	Before construction commences	<ul style="list-style-type: none"> • Vaporox (Pty) Ltd • Plant designer
<ul style="list-style-type: none"> • Soil, stormwater or groundwater pollution due to the inadequate design of the ablation facilities 	To ensure adequate design of the ablation facilities	<ul style="list-style-type: none"> • The planning phase must determine whether the existing ablation 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 ablation facilities must be repaired and upgraded to acceptable standards. 	Vaporox (Pty) Ltd must verify implementation of the mitigation measures proposed in this EMP.	Before construction commences	<ul style="list-style-type: none"> • Vaporox (Pty) Ltd • Plant designer
<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 inadequate design, repair and/or replacement of the water pipeline system 	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 durability in mind. • Meters must be installed to monitor the volume of water used at the pyrolysis plant. 	Vaporox (Pty) Ltd must verify implementation of the mitigation measures proposed in this EMP.	Before construction commences	<ul style="list-style-type: none"> • Vaporox (Pty) Ltd • Plant designer
<ul style="list-style-type: none"> • Wastage of a valuable natural resource (water) due to the inadequate design of the water storage vessels 	To ensure adequate design of the water storage vessels	<ul style="list-style-type: none"> • 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. 	Vaporox (Pty) Ltd must verify implementation of the mitigation measures proposed in this EMP.	Before construction commences	<ul style="list-style-type: none"> • Vaporox (Pty) Ltd • Plant designer
<ul style="list-style-type: none"> • Wastage of a valuable natural resource (diesel) due to the inadequate design or ineffective operation of the backup generator 	To ensure adequate design and effective operation of the backup diesel generator	<ul style="list-style-type: none"> • 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. 	Vaporox (Pty) Ltd must verify implementation of the mitigation measures proposed in this EMP.	Before construction commences	<ul style="list-style-type: none"> • Vaporox (Pty) Ltd • Plant designer
<ul style="list-style-type: none"> • Delays due to poor planning. • Legal non-compliances to the Waste Management Licence and EMP. • Harm to the environment. 	To ensure pro-active planning for the construction phase of the Waste Tyre Pyrolysis Plant	<ul style="list-style-type: none"> • Obtain permission from the local municipality for the discharge of washwater into the municipal sewage disposal system, if required. • The approved EMP and Waste Management Licence 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 Waste Management Licence and EMP are kept at the construction site from the first day of construction. • Source unskilled labour locally, wherever possible. 	Vaporox (Pty) Ltd must verify implementation of the mitigation measures proposed in this EMP.	Before construction commences	<ul style="list-style-type: none"> • Vaporox (Pty) Ltd



		<ul style="list-style-type: none"> A construction site plan must be compiled and 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 4: EMP - Construction, Operational, Rehabilitation and Decommissioning Phases – 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	Environmental Objective	Management / Mitigation Measures	Monitoring and Compliance Reporting	Timeframe	Responsibility
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.	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. 	ECO to verify implementation of the mitigation measures proposed in this EMP. ECO to submit monthly compliance reports to the competent authority.	During the construction phase.	<ul style="list-style-type: none"> Construction contractor ECO
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.	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 potentially impact the environment. 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. 	<ul style="list-style-type: none"> Regular site inspections. Internal audits against this EMP must be conducted every 6 months and records kept onsite. Shortcomings must immediately be addressed. 	Life of operation	Facility Manager
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 5: EMP - Construction, Operational, Rehabilitation and Decommissioning Phases: Atmosphere and Noise

Nature and significance of environmental impact					
Impact Description	Environmental Objective	Management / Mitigation Measures	Monitoring and Compliance Reporting	Timeframe	Responsibility
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. 					
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 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</p>	<p>To minimise noise generation during the construction phase.</p>	<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 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 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. 	<p>ECO to verify implementation of the mitigation measures proposed in this EMP. ECO to submit monthly compliance reports to the competent authority.</p>	<p>During the construction phase.</p>	<ul style="list-style-type: none"> Construction contractor ECO



installation/construction of the Waste Tyre Pyrolysis plant and its associated structures.					
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>	To minimise the noise and nuisance generated by the operational activities.	<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. 	<ul style="list-style-type: none"> Regular site inspections. Internal audits against this EMP must be conducted every 6 months and records kept onsite. Shortcomings must immediately be addressed. 	Life of Operation	Facility Manager
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 6: EMP - Construction, Operational, Rehabilitation and Decommissioning Phases: 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	Environmental Objective	Management / Mitigation Measures	Monitoring and Compliance Reporting	Timeframe	Responsibility
Construction Phase					



<p>Degradation and loss of a valuable resource (topsoil), where degraded vegetation needs to be cleared for the waste tyre storage area.</p>	<p>To reduce the duration and extent of topsoil exposure so as to preserve it as a resource and protect it from erosion.</p>	<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 be used to replace it. The suitability of substitute topsoil will be determined by a soil analysis and approved by the ECO. • 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. 	<p>ECO to verify implementation of the mitigation measures proposed in this EMP. ECO to submit monthly compliance reports to the competent authority.</p>	<p>During the construction phase.</p>	<ul style="list-style-type: none"> • Construction contractor • ECO
<p>Operational Phase</p>					
<p>Soil erosion due to improper management of stormwater onsite.</p>	<p>To ensure adequate stormwater management and to prevent soil erosion.</p>	<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. 	<ul style="list-style-type: none"> • Regular site inspections. • Internal audits against this EMP must be conducted every 6 months and records kept onsite. Shortcomings must immediately be addressed. 	<p>Life of Operation</p>	<p>Facility Manager</p>
<p>Decommissioning Phase</p>					
<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>				

Table 7: EMP - Construction, Operational, Rehabilitation and Decommissioning Phases: 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.
<p>Aspect: Construction Phase</p> <ul style="list-style-type: none"> • 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	Environmental Objective	Management / Mitigation Measures	Monitoring and Compliance Reporting	Timeframe	Responsibility
Construction Phase					
Soil, stormwater and groundwater pollution due to spillages and/or improper handling-, storage-, mixing- or disposal- of cement and concrete.	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 rubble stockpile. • 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. 	ECO to verify implementation of the mitigation measures proposed in this EMP. ECO to submit monthly compliance reports to the competent authority.	During the construction phase.	<ul style="list-style-type: none"> • Construction contractor • ECO
Soil, stormwater and groundwater pollution due to poor management and accidental spills of hazardous chemical substances including fuel, greases and oils used onsite.	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.	<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. 	ECO to verify implementation of the mitigation measures proposed in this EMP. ECO to submit monthly compliance reports to the competent authority.	During the construction phase.	<ul style="list-style-type: none"> • Construction contractor • ECO



		<ul style="list-style-type: none"> • 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 be protected and proper dispensing equipment is to be used i.e. hand pumps and funnels. Drums may not be tipped to dispense fuel. • 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. 			
<p>Soil, stormwater and groundwater pollution due to poor waste management. Nuisance caused by odours and unsightly appearance of waste onsite.</p>	<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. 	<p>ECO to verify implementation of the mitigation measures proposed in this EMP. ECO to submit monthly compliance reports to the competent authority.</p>	<p>During the construction phase.</p>	<ul style="list-style-type: none"> • Construction contractor • ECO



<p>Soil, stormwater and groundwater pollution from unsanitary conditions onsite.</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>ECO to verify implementation of the mitigation measures proposed in this EMP. ECO to submit monthly compliance reports to the competent authority.</p>	<p>During the construction phase.</p>	<ul style="list-style-type: none"> • Construction contractor • ECO
<p>Soil and water pollution as a result of contaminated wash water entering the environment.</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>ECO to verify implementation of the mitigation measures proposed in this EMP. ECO to submit monthly compliance reports to the competent authority.</p>	<p>During the construction phase.</p>	<ul style="list-style-type: none"> • Construction contractor • ECO
<p>Hydrocarbon pollution of soil, stormwater and groundwater due to the fuel-, grease- or oil spillages or leaking equipment and vehicles.</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 or oil shall be treated as hazardous waste and removed from site. • 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. 	<p>ECO to verify implementation of the mitigation measures proposed in this EMP. ECO to submit monthly compliance reports to the competent authority.</p>	<p>During the construction phase.</p>	<ul style="list-style-type: none"> • Construction contractor • ECO
<p>Operational Phase</p>					
<p>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.</p>	<p>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.</p>	<p>Apply the same mitigation measures as for the construction phase.</p>	<ul style="list-style-type: none"> • Regular site inspections. • Internal audits against this EMP must be conducted every 6 months and records kept onsite. Shortcomings must immediately be addressed. 	<p>Life of Operation</p>	<p>Facility Manager</p>



<p>Soil, stormwater and groundwater pollution due to poor waste management during operational activities. Nuisance caused by odours and unsightly appearance of waste onsite.</p> <p>Domestic waste will be removed from site by the municipal waste removal service.</p>	<p>To prevent and minimise soil, stormwater and groundwater pollution and nuisance due to poor waste management.</p>	<ul style="list-style-type: none"> • The Waste Tyre Pyrolysis Plant must obtain a Waste Management License 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. • 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. 	<ul style="list-style-type: none"> • Regular site inspections. • Internal audits against this EMP must be conducted every 6 months and records kept onsite. Shortcomings must immediately be addressed. 	<p>Life of Operation</p>	<p>Facility Manager</p>
<p>Soil, stormwater and groundwater pollution from unsanitary conditions onsite during operational activities.</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. • 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. 	<ul style="list-style-type: none"> • Regular site inspections. • Internal audits against this EMP must be conducted every 6 months and records kept onsite. Shortcomings must immediately be addressed. 	<p>Life of Operation</p>	<p>Facility Manager</p>
<p>Soil, stormwater and groundwater pollution as a result of contaminated wash water entering the environment during operational activities.</p> <p>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.</p>	<p>To prevent soil, stormwater and groundwater pollution by contaminated wash water.</p>	<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. 	<ul style="list-style-type: none"> • Regular site inspections. • Internal audits against this EMP must be conducted every 6 months and records kept onsite. Shortcomings must immediately be addressed. 	<p>Life of Operation</p>	<p>Facility Manager</p>

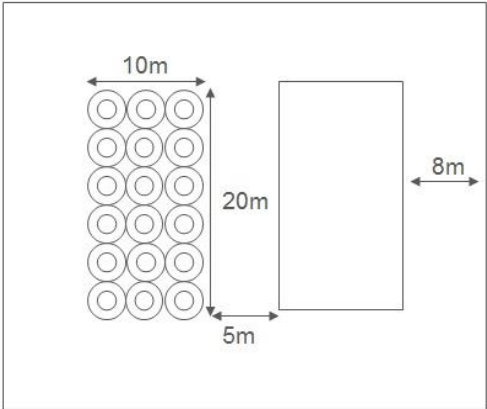


		<ul style="list-style-type: none"> • Subject to the above permission, the wash water must comply with the standards and criteria set out in Schedules "A" and "B" of the Water and Sanitation By-laws, 2008. Preliminary treatment may be required to ensure that these standards and criteria are met. • Subject 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 sewage disposal system must be maintained in a proper condition and free from leaks. • 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. 			
<p>Soil and groundwater pollution from leaking or broken sewerage pipes.</p>	<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. 	<ul style="list-style-type: none"> • Regular site inspections. • Internal audits against this EMP must be conducted every 6 months and records kept onsite. Shortcomings must immediately be addressed. 	<p>Life of Operation</p>	<p>Facility Manager</p>



<p>Contamination of clean stormwater runoff when the water runs through “dirty” areas on the site.</p>	<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. 	<ul style="list-style-type: none"> • Regular site inspections. • Internal audits against this EMP must be conducted every 6 months and records kept onsite. Shortcomings must immediately be addressed. 	<p>Life of Operation</p>	<p>Facility Manager</p>
<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 benzo(a)pyrene, chrysene, benzo(a)anthracene, etc.) in the oil that is produced; • 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>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 stipulated in GNR. 926 of 29 November 2013. • 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. 	<ul style="list-style-type: none"> • Regular site inspections. • Internal audits against this EMP must be conducted every 6 months and records kept onsite. Shortcomings must immediately be addressed. 	<p>Life of Operation</p>	<p>Facility Manager</p>



		 <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 contaminated by oil from the burning of the tyres can be contained. 			
<p>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.</p>	<p>To ensure that the pyrolysis oil, steel and Carbon black is stored in a safe and responsible manner.</p>	<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 bund 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 bund 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. 	<ul style="list-style-type: none"> • Regular site inspections. • Internal audits against this EMP must be conducted every 6 months and records kept onsite. Shortcomings must immediately be addressed. 	<p>Life of Operation</p>	<p>Facility Manager</p>
<p>Inadequate storage of ash may result in the leaching of zinc and sulphur when rain water infiltrates through the ash.</p> <p>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.</p>	<p>To prevent the inadequate storage of ash that may be generated under abnormal conditions.</p>	<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. 	<ul style="list-style-type: none"> • Regular site inspections. • Internal audits against this EMP must be conducted every 6 months and records kept onsite. Shortcomings must immediately be addressed. 	<p>Life of Operation</p>	<p>Facility Manager</p>
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</p>	<p>N/A</p>				



North West Department of Rural, Environmental and Agricultural Development prior to decommissioning.
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Table 8: EMP - Construction, Operational, Rehabilitation and Decommissioning Phases: Resources

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"> Inefficient and redundant use of valuable resources. 					
Operational Phase					
<ul style="list-style-type: none"> 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	Environmental Objective	Management / Mitigation Measures	Monitoring and Compliance Reporting	Timeframe	Responsibility
Construction Phase					
<p>Wastage or depletion of valuable resources like water and electricity due to inefficient or redundant usage.</p> <p>Water and electricity will be obtained from the municipality using existing bulk service connections to the site.</p>	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. 	ECO to verify implementation of the mitigation measures proposed in this EMP. ECO to submit monthly compliance reports to the competent authority.	During the construction phase.	<ul style="list-style-type: none"> Construction contractor ECO
Operational Phase					
Wastage or depletion of water from the municipal water supply due to leaking or broken water pipelines and water storage vessels.	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. 	<ul style="list-style-type: none"> Regular site inspections. Internal audits against this EMP must be conducted every 6 months and records kept onsite. Shortcomings must immediately be addressed. 	Life of Operation	Facility Manager
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.	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. 	<ul style="list-style-type: none"> Regular site inspections. Internal audits against this EMP must be conducted every 6 months and records kept onsite. Shortcomings 	Life of Operation	Facility Manager



			must immediately be addressed.		
Wastage or depletion of valuable resources, such as LPG and water, due to inefficient or ineffective operation of the Waste Tyre Pyrolysis plant.	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. 	<ul style="list-style-type: none"> Regular site inspections. Internal audits against this EMP must be conducted every 6 months and records kept onsite. Shortcomings must immediately be addressed. 	Life of Operation	Facility Manager
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 9: EMP - Construction, Operational, Rehabilitation and Decommissioning Phases: 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	Environmental Objective	Management / Mitigation Measures	Monitoring and Compliance Reporting	Timeframe	Responsibility
Construction Phase					
Injury of employees and contractors working on site during the construction phase.	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. 	ECO to verify implementation of the mitigation measures proposed in this EMP. ECO to	During the construction phase.	<ul style="list-style-type: none"> Construction contractor ECO



		<ul style="list-style-type: none"> 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. 	submit monthly compliance reports to the competent authority.		
Inadequate construction of the LPG storage tank can lead to failures during the operational phase.	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). 	ECO to verify implementation of the mitigation measures proposed in this EMP. ECO to submit monthly compliance reports to the competent authority.	During the construction phase.	<ul style="list-style-type: none"> Construction contractor ECO
Inadequate construction of the pyrolysis oil storage tank(s) can lead to failures during the operational phase.	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. 	ECO to verify implementation of the mitigation measures proposed in this EMP. ECO to submit monthly compliance reports to the competent authority.	During the construction phase.	<ul style="list-style-type: none"> Construction contractor ECO
Operational Phase					
Injury of employees working on site during the operation of the Waste Tyre Pyrolysis Plant.	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, 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. 	<ul style="list-style-type: none"> Regular site inspections. Internal audits against this EMP must be conducted every 6 months and records kept onsite. Shortcomings must immediately be addressed. 	Life of Operation	Facility Manager
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-	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. 	<ul style="list-style-type: none"> Regular site inspections. Internal audits against this EMP must be conducted every 6 months and records 	Life of Operation	Facility Manager



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. 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. 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 the vapour phase in ambient air.		<ul style="list-style-type: none"> 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. Adequate firefighting equipment must be kept at the LPG storage tank. Use a suitable extinguishing media. 	kept onsite. Shortcomings must immediately be addressed.		
The incorrect storage of the pyrolysis oil may lead to fires and harm to employees.	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. 	<ul style="list-style-type: none"> Regular site inspections. Internal audits against this EMP must be conducted every 6 months and records kept onsite. Shortcomings must immediately be addressed. 	Life of Operation	Facility Manager
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 10: EMP - Construction, Operational, Rehabilitation and Decommissioning Phases: 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	Environmental Objective	Management / Mitigation Measures	Monitoring and Compliance Reporting	Timeframe	Responsibility
Construction Phase					
Construction activities may disturb or destroy sites, features or artefacts of archaeological and/or historical importance.	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.	ECO to verify implementation of the mitigation measures proposed in this EMP. ECO to submit monthly compliance	During the construction phase.	<ul style="list-style-type: none"> Construction contractor ECO



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 resources would be low. To date, no comments have been received from the South African Heritage Resources Agency.			reports to the competent authority.		
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.	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.	<ul style="list-style-type: none"> Regular site inspections. Internal audits against this EMP must be conducted every 6 months and records kept onsite. Shortcomings must immediately be addressed. 	Life of Operation	Facility Manager
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 11: EMP - Construction, Operational, Rehabilitation and Decommissioning Phases: 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	Environmental Objective	Management / Mitigation Measures	Monitoring and Compliance Reporting	Timeframe	Responsibility
Construction Phase					
Wear of access roads, accidents on access roads, unpermitted transport of materials and/or loss of materials being transported on access roads.	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. 	ECO to verify implementation of the mitigation measures proposed in this EMP. ECO to submit monthly compliance reports to the competent authority.	During the construction phase.	<ul style="list-style-type: none"> Construction contractor ECO
Operational Phase					



<p>Wear of access roads, accidents on access roads, unpermitted transport of materials and/or loss of materials being transported on access roads.</p>	<p>To minimise the impact of an increase of traffic on access roads to the Waste Tyre Pyrolysis Plant.</p>	<ul style="list-style-type: none"> Apply the same mitigation measures as for the construction phase. 	<ul style="list-style-type: none"> Regular site inspections. Internal audits against this EMP must be conducted every 6 months and records kept onsite. Shortcomings must immediately be addressed. 	<p>Life of Operation</p>	<p>Facility Manager</p>
<p>Decommissioning Phase</p>					
<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>				



6. ENVIRONMENTAL AWARENESS PLAN

The following Environmental Awareness Plan must be implemented by Vaporox (Pty) Ltd in order to inform their employees and contractors of the environmental risk that may result from their work. The plan must be conducted as part of the induction process for all new employees (including contractors) that will perform work in terms of the proposed activities. Proof of all training provided must be kept on-site.

The Environmental Awareness Plan is referred to as the “SHE match” training programme. The training programme focuses on the following aspects:

1. Explaining clearly what the environment is and what the environment consist of namely: air, water, soil, fauna, flora and people.
2. Once participants have grasped the description of what the environment entails, the training focuses on the potential impacts that the construction and operational activities may have on each one of these environmental components. This is done by making use of the aspect register, where each one of the environmental aspects and associated impacts has been identified.
3. To ensure that the training is effective, visual aids are used. Photos are taken of actual and potential impacts occurring on site and in some cases role-play is used to illustrate a potential impact.
4. The participants are then exposed to a poster that reflects the various environmental components. The various photos taken are posted on the poster on a rotational basis and the participants indicate (based on the visual component) what environmental component was or could have been affected by the activities portrayed on the photo.
5. By doing this the participants visualise the action as well as the potential consequence (environmental impact) of their action.
6. This general awareness training must be done before construction commences and also when new employees start work. The training should be done every two years during the Operational Phase. The poster is posted in the communal area where the impacts are visualised and the photos rotated on a monthly basis.

