



Operational Techniques and Monitoring Plan

Stoke Tyre Pyrolysis Facility

Murfitts Industries Limited

CRM 0180 001 PE R 006



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Operational Techniques and Monitoring Plan – CRM 0180 001 PE R 006

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1.0 Introduction

1.1 Overview

- 1.1.1 Murfitts Industries Limited (hereby referred to as “the Operator”) proposes to operate a Small Waste Incineration Plant (SWIP) to be located off Campbell Road, Oakhill, Stoke-on-Trent, England, ST4 4EW, United Kingdom.
- 1.1.2 The Facility will import up to 11 388 tpa of tyre crumb for processing. The tyre crumb will be converted to syngas using pyrolysis technology. The syngas is then combusted to produce heat to raise steam in a boiler. The majority of the steam produced will be utilised in the neighbouring Michelin tyre-retreading process. The plant will also produce tyre pyrolysis oil (TPO) and raw recovered carbon black (rCB) for either export off-site or further treatment on-site. These two products of the process will be subject to end-of waste applications. This will enable them to be utilised as products.
- 1.1.3 The tyre crumb will be imported from end of life tyre processing facilities operated by Murfitts Industries Limited. The plant will have a maximum throughput of 1.5 tonnes per hour of tyre crumb.
- 1.1.4 This document has been prepared to support a Part A(2) Small Waste Incineration Plant (SWIP) Permit Application comprising the following listed activities under the Environmental Permitting (England and Wales) Regulations 2016 (as amended):
- Schedule 13A – A waste incineration plant or waste co-incineration plant with a capacity less than or equal to 10 tonnes per day for hazardous waste or 3 tonnes per hour for non-hazardous wastes.
- 1.1.5 This document has been prepared to fulfil the requirements set out within Sections C2 ,C3, D1, D3, D4, D5, D6, D7, D8, E1, E2 of the Permit application form; to provide details of the operational techniques that will be used to minimise and control emissions from the proposed facility; and to demonstrate that the technology selection and control measures to be implemented follow appropriate guidance.

1.2 The Applicant

- 1.2.1 The Facility will be operated by Murfitts Industries Limited.
- 1.2.2 Murfitts Industries Limited is a private limited company, whose registered office address is Etel House, Avenue One, Letchworth Garden City, England, SG6 2HU. The Company Number as registered on Company’s House is: 04012599 and was incorporated on 12th June 2000.

1.3 Site Location

- 1.3.1 The proposed Facility’s full address is:

Stoke Tyre Pyrolysis Facility
Campbell Road,
Oakhill,
Stoke
Stoke-on-Trent
ST4 4EW

1.3.2 The proposed Facility will occupy approximately 0.617ha of land which is approximately centred at national grid reference SJ 86964 43232. The location of the site is illustrated below and on the map provided in the Drawings Section of this Application referenced CRM 0180 001 PE D 001 Site Location Plan.

Figure 1.3.1: Facility Location



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1.3.3 The proposed development is located off Campbell Road, within an existing industrial and business park, adjacent to Michelin’s UK head office, commercial quarters and the wider Michelin site.

1.4 Regulated Activities

1.4.1 The facility will consist of a pyrolysis plant, processing a total of 11 388tpa of tyre crumb from end-of-life tyres per annum.

1.4.2 The Operator is applying to City of Stoke-on-Trent Council to operate the Facility under a Part A (2) SWIP Permit.

1.4.3 The plant will accept feedstock defined within Article 3.1 of the Waste Framework Directive (tyre crumb) and will be limited to processing no more than 1.5 tonnes per hour of material based upon a continuous operational run time.

1.4.4 The Draft Environmental Permitting Technical Guidance Note PG13/1(20), Reference document for the operation of small waste incineration plants (SWIPs) (referred to as ‘PG13/1’). PG13/1 states:

“In determining whether a SWIP is an incineration or a co-incineration plant, the regulator will have regard to the main purpose of the plant. Where the main purpose of the plant is the generation of energy or the production of material products, the SWIP shall be considered to be a co-incineration plant.”

- 1.4.5 As the main purpose of the plant is to thermally treat waste to produce usable products (recovered carbon black and tyre pyrolysis oil), it is regulated as a co-incineration plant.
- 1.4.6 The facility will also produce steam to be utilised predominantly within the neighbouring Michelin tyre retreading facility.
- 1.4.7 The boiler will produce 3.7MWth of steam, which will be utilised in the neighbouring Michelin Tyre Retreading Facility.
- 1.4.8 The scope of all regulated activities is summarised in Table 1.4.1 below.

Table 1.4.1: Regulated Activities

Activity	Description of Specified Activity	R & D Codes
Schedule 13A - A waste incineration plant or waste co-incineration plant with a capacity less than or equal to 10 tonnes per day for hazardous waste or 3 tonnes per hour for non-hazardous wastes	<p>The receipt of tyre crumb from ELT's.</p> <p>Gas conditioning, involving the separation of liquids from the gas</p> <p>The thermal treatment (by pyrolysis) of granulated tyres to produce a gas, which is condensed, removing the tyre pyrolysis oil. The remaining non-condensable gas is combusted for use in a boiler to produce steam and then cleaned.</p> <p>Flue gas cooling and conditioning.</p>	<ul style="list-style-type: none"> • D10: Incineration on Land (Burning Waste in Combustion Unit) • D15: Temporary storage of wastes pending D10 activities • D9: Physico-chemical treatment resulting in final compounds or mixtures which are discarded by any of the operations numbered D1 to D12.
Directly Associated Activities		
Receipt and storage of granulated tyres	From receipt of tyre crumb to entry into the pyrolysis facility	R13 Storage of waste pending any of the operations numbered R1 to R12.
Raw material reception and storage	Storage of liquids in bunded areas And solids in dedicated buildings.	D15 temporary storage of wastes pending any of the operations numbered D1 to D14 (excluding temporary storage, pending collection, on the site where it is produced)
Product storage and handling	Storage of tyre pyrolysis oil (TPO). Storage of carbon black.	
rCB cooling and bagging	Cooling, bagging and storage of rCB for transfer off-site for further processing.	
Raw rCB milling and pelletising	Milling, pelletising and cooling raw rCB,	
Cooling system	Various cooling processes	
Flare	Combustion of gas in a flare in an emergency or as a result of abnormal operation	

Combustion	Combustion of diesel in a generator. Utilised for <50 hours per annum and in the case of an emergency/abnormal operations.	
Dust extraction and abatement	Treatment of waste gases	
Storage and handling of wastes generated by the process	From generation of waste to dispatch off-site	

1.5 Planning Status

1.5.1 Planning application for the Facility as described was submitted to City of Stoke-on-Trent Council on 8th July 2025, and determination is awaited.

1.6 Relevant Legislation and Guidance

1.6.1 The proposed activities are subject to a number of National, European and International legislation, statutory and non-statutory guidance documents. Operators are required through the Permit application process, to demonstrate how they will comply with the relevant requirements of this legislation and guidance.

1.6.2 This application has been prepared using the Draft Environmental Permitting Technical Guidance Note PG13/1(20), Reference document for the operation of small waste incineration plants (SWIPs).

1.6.3 The following pieces of legislation and guidance are relevant to the proposed operations:

- Environment Permitting Technical Guidance PG13/1(20), Reference document for the operation of small waste incineration plants (SWIPs).
- The Environmental Permitting (England and Wales) Regulations 2016 (as amended);
- Chapter IV of Directive 2010/75/EU of the European Parliament and of the Council of 24 November 2010 on industrial emissions (integrated pollution prevention and control) Text with EEA relevance (IED ChIV).
- Environmental Permitting: General Guidance Manual on Policy and Procedures for A2 and B Installations, Defra: April 2012;
- Environmental Permitting Core Guidance, Defra; March 2013 (as amended);
- Environmental Permitting Guidance: The Waste Framework Directive, Defra 2009; and
- The Environment Agency's Regulatory Guidance Note series; in particular RGN2 for the purpose of defining the installation as a 'SWIP'.

2.0 Process Description

2.1 Overview

- 2.1.1 This section of the report describes the purpose and operation of the proposed Facility.
- 2.1.2 The process will receive up to 11,388tpa of end of life tyre crumb from end-of-life tyre (ELT) processing facilities operated by Murfitts Industries Limited. This may include directly from the adjacent ELT processing facility. The tyre crumb is loaded into a conveying systems which transfers it to the first stage pyrolysis units where it is heated in the absence of oxygen causing the tyres to decompose into a raw rCB and hot pyrolysis gas.
- 2.1.3 The raw rCB is transferred to a second pyrolysis chamber where it is further heated driving off any remaining volatile material, the pyrolysis gas from this second stage being blended with the pyrolysis gas from the first stage pyrolysis.
- 2.1.4 The raw rCB is cooled and transferred to big bags. These bags are then removed from site or processed on site with milling, pelletising and drying depending on market demand.
- 2.1.5 If the raw rCB is to be processed on site, it will be transferred in the big bag to a separate processing room within the pyrolysis building. The raw rCB is then milled, wet pelletised, dried and bagged, ready for use as a product off-site.
- 2.1.6 The blended pyrolysis gas from the pyrolysis stage is passed through a condenser, separating the TPO from the non-condensable syngas. The TPO is stored ready for collection by end users. The syngas is combusted in a boiler to generate steam. The steam is used by the neighbouring Michelin facility in their process and the flue gas is treated to remove contaminants and ensure compliance with the emission criteria.
- 2.1.7 Figure 2.1.1 below provides an overview of the process

- Cooling and bagging of raw rCB
- Milling and wet pelletising and drying of raw rCB
- Storage of TPO
- Combustion of waste tyre derived gas and natural gas in 1no combustion chambers to produce steam in 1no boilers
- Emergency Flare
- Emergency back up diesel generator
- Nitrogen production, storage and use
- Ancillary processes
 - Cooling system
 - Dust filtration and extraction
 - Supply of steam from boiler
 - Site drainage
 - Raw material and product storage

2.1.10 The operation of the facility is described below.

2.2 Receipt of Tyre Crumb

- 2.2.1 The Facility will receive prepared end-of-life tyre crumb from Murfitts Industries Limited permitted facilities. This will include being fed directly from an adjacent processing facility. Delivery vehicles report to the weighbridge building office on arrival, where duty of care waste transfer notes are checked.
- 2.2.2 The received crumb is nominally 10mm and free of fibre and steel. Crumb is delivered in big bags, which hold approximately 1 tonne of crumb. The bags are emptied into the Facility's conveying system within the processing building.
- 2.2.3 If bags of crumb are received from the neighbouring ELT facility deliveries, they are managed to occur on a 'just in time ' basis and the maximum storage of crumb filled bags within the pyrolysis building is usually 4 tonnes. When the neighbouring ELT plant is unavailable, bags of tyre crumb will be sourced from another of Murfitts Industries Limited's permitted facilities. In the case of this operation a curtain sided lorry will deliver 24 tonnes of tyre crumb to ensure the pyrolysis plant can continue operations.
- 2.2.4 The bags are reuseable and will be sent back to the ELT facility for refilling. The crumb is fed into the pyrolysis plant at a controlled rate via screw conveyors.
- 2.2.5 The building operates under negative pressure to reduce the risk of fugitive emissions.

2.3 Pyrolysis Process

- 2.3.1 The crumb is discharged from the big bags into an enclosed conveyor, elevating the crumb and discharging into a 1m^3 day bin. The crumb is discharged from the day bin into the pyrolysis plant at a controlled rate using screw conveyors.
- 2.3.2 The first stage of the pyrolysis process consists of electrically heated screws, which operate at between 450-500°C.
- 2.3.3 The hot syngas from the screw is directed to the condenser unit, which operates at a negative pressure of -1 to -3mbarg, where the TPO and syngas are separated.
- 2.3.4 The solid fraction is discharged into a secondary pyrolysis unit, an electrically heated screw, operating at 600-650°C. The remaining volatiles are driven off and directed to the condenser unit. The solid material, raw rCB, enters a water-cooled screw reducing its temperature to <math><50^\circ\text{C}</math>.
- 2.3.5 The cooling water uses a closed loop cooling system with no product contact.
- 2.3.6 The raw rCB is then loaded into big bags for transfer to Murfitt's rCB production system on site or transferred to end users depending on market demands.

2.4 TPO and Syngas Processing

- 2.4.1 The pyrolysis screws have their own associated condenser system, which comprises a quench column and collecting tank.
- 2.4.2 The TPO from the collection tank is recirculated through a filter with a bleed out to the TPO storage tanks. The recirculated TPO is cooled in a heat exchanger using a closed loop water cooling system. The cooled TPO contacts the hot syngas, cooling it and causing the heavier hydrocarbons to condense into the liquid phase and collect in the base of the column. The condensing tower also washes out particulate into the TPO. The syngas is taken off the TPO collecting tank, at the base of the condenser, passed through a fan to control pressure in the pyrolysis screw and to the syngas burner.
- 2.4.3 The TPO collecting tank at the base of the scrubber is connected to a water seal, which provides an emergency release to an enclosed ground flare. In the event the syngas combustion chamber, boiler or downstream flue gas treatment become unavailable an isolating valve on the syngas line to the combustion chamber closes, allowing the pressure in the syngas supply line to increase and overcome the static head in the water seal, nominally 2-3mbag. This will only be used under abnormal conditions and allows pyrolysis gas to be safely combusted and released to atmosphere while the plant is being shut down.
- 2.4.4 The TPO storage tanks are periodically discharged into a road going tanker for removal from site and transported to end users when the required quality checks have been completed.
- 2.4.5 For initial start-up, diesel will be used as the recirculating scrubbing liquor and be gradually removed into the TPO, until the recirculating liquor is fully TPO.

2.5 Raw rCB Storage and Treatment

- 2.5.1 The site will either send the raw rCB off site as described in 2.3.6 above or treat it on site.

- 2.5.2 The rCB production facility is within a separate room in the pyrolysis building. The raw rCB will be delivered to the room in the big bags which will be unloaded onto a screw conveyor which feeds the rCB production system feed hopper.
- 2.5.3 The feed hopper is fitted with a protective grid to ensure no oversize material can enter the system.
- 2.5.4 Pneumatic conveying is utilised to transfer the raw rCB from the feed hopper to the classifier mill which gives the rCB uniform particle size.
- 2.5.5 From the feed hopper the rCB is mixed with water, which acts as a binding agent, and fed into the pellet mill to produce rCB pellets within the range of 0.125 to 2mm.
- 2.5.6 The rCB pellets are passed through a fluid bed dryer to reduce the moisture content to <1.0%. The steam produced by the boiler is able to be used as a heat source for the drier and will be supplemented with natural gas to ensure adequate drying heat is available. The dryer exhaust gas will be passed through a bag filter in order to reduce particulates before it is released to atmosphere.
- 2.5.7 The plant will produce up to 4,214tpa of rCB pellets.

2.6 Syngas Combustion and Steam Generation

- 2.6.1 The syngas feeds a waste gas combustion chamber capable of burning syngas and natural gas; the pilot will be natural gas fired and the burner will start up using natural gas until stable flame condition is achieved and syngas can be introduced, a natural gas assist will be maintained at all times. This will be a skid mounted assembly along with the combustion chamber, combustion air fan and control panel.
- 2.6.2 The combustion chamber shall be sized to allow 2 seconds residence time of the flue gas after last injection of air at a temperature of 850C. At the nominal operating capacity, the burner generates sufficient heat to raise 4.2tph of saturated steam at 20barg.
- 2.6.3 The boiler configuration will be a fire tube (shell and tube) boiler and will be fitted with a pressure relief valve to allow safe releases should overpressure occur.
- 2.6.4 The boiler plant includes:
- Pressurised deaerator
 - Water treatment equipment
 - Blowdown vessel
 - Condensate storage tank
- 2.6.5 Steam and boiler feed water is passed over the site boundary for use at the Michelin Facility.
- 2.6.6 The steam system will include a dump condenser, which is designed to take the full steam load, condense and cool it and return it to the condensate storage tank. This will be used as an emergency system to allow the steam to be condensed should Michelin be offline, or the steam production exceed the Michelin demand, for example due to a Michelin maintenance outage.

2.7 Flue Gas Treatment

- 2.7.1 The flue gas exits the syngas combustion boiler at a temperature of 180-200°C and is cleaned prior to release to atmosphere. The flue gas is injected with a mixture of sodium bicarbonate and activated carbon after leaving the boiler. The addition of the sodium bicarbonate neutralises the acid gasses and the activated carbon captures heavy metals.
- 2.7.2 The mixture of the flue gas and reagents passes through a bag filter which captures the reagents and ash, while letting the cleaned gas pass through.
- 2.7.3 The bag filter has a back pulse of compressed air controlled by the pressure drop over the filter unit which periodically removes the reagent and ash filter cake. The filter cake is collected in a hopper at the base of the filter and discharged into a sealed container via a screw conveyor. The filter cake and APC residues are sent off-site for disposal at an appropriately permitted hazardous waste facility.
- 2.7.4 The cleaned flue gasses are passed through an ID fan, which controls the pressure within the combustion chamber, boiler and bag house filter before being discharged to atmosphere via a stack. The stack will be fitted with a continuous emissions monitoring system (CEMS).
- 2.7.5 NOx emissions are controlled via a flue gas recirculation system.

2.8 Emergency Flare

- 2.8.1 An emergency flare will be installed. The flare will be operated during start-up and shut-down, when the boiler is not operating due to abnormal operation and in the case of an emergency to prevent build-up, or release of combustible gas from the pyrolysis process.
- 2.8.2 The flare will not be used during routine operation. Records of operation will be maintained.

2.9 Storage of Raw Materials and Products

- 2.9.1 In line with relevant guidance, all raw materials and site consumables including water must be measured to ensure that they are used efficiently. The Operator will undertake the following as a minimum:
- Maintain records of all consumables and water usage on site;
 - Review and record where there are suitable alternative materials identified that could reduce environmental impact or opportunities to improve the efficiency of raw material and water use; and
 - Implement further measures when appropriate.
- 2.9.2 All raw materials will be delivered to site via road, during operational hours. Details of the types and amounts of raw materials are provided in Appendix A of this report.
- 2.9.3 All raw chemicals will be handled in accordance with COSHH Regulations as part of quality assurance and safety procedures. Full product data sheets will be available for review by personnel on site.
- 2.9.4 All liquid chemicals stored on-site will be serviced within suitable secondary containment with a minimum capacity of either 110% of the capacity of the largest vessel or 25% of the total volume (whichever is the greatest). Any spills or leaks will be retained in these areas and treated locally.

2.9.5 The Operator will give due consideration to the environmental impact of all new purchases of raw materials of the site.

2.10 Cooling System

2.10.1 The cooling water system is a closed loop system which will comprise mains water supplemented with anti-corrosion additives and with ethylene glycol as an anti-freeze. A supply of water will be needed to top up the cooling water system to replace any losses.

2.11 Nitrogen Storage and Use

2.11.1 Nitrogen gas is primarily used to prevent the egress of syngas from the process and air ingress to the process.

2.11.2 Nitrogen is generated using a PSA Generator. The nitrogen is stored within a 1m³ accumulator within the pyrolysis building at a pressure of approximately 7 barg.

2.12 Site Drainage

2.12.1 There are sources of foul effluent arising from the processes described above:

- Boiler blowdown
- Condensate

2.12.2 The condensate and blowdown are piped over to the existing infrastructure at the neighbouring Michelin Site. An agreement is in place with Michelin for this process. These effluent streams are then released to the foul sewer via a trade effluent consent issued by Severn Trent Water.

2.12.3 Clean surface water run-off, from the roof and external areas will be collected and stored within an underground proprietary crate attenuation system before being released at a controlled rate to the River Trent.

2.12.4 A drainage plan is included within the Drawings Section of this Application.

3.0 Operational Techniques

3.1 Introduction

3.1.1 This section of the report describes the management and operational techniques in place to minimise emissions.

3.2 Waste Acceptance, Storage and Feeding

3.2.1 The proposed Facility will accept no more than 11,388 tonnes of tyre crumb per annum. The pyrolysis plant will process the crumb, at a total maximum throughput of 1.5 tonnes per hour.

3.2.2 The feedstock will consist of end of life tyre crumb, which will have undergone treatment at the adjacent ELT facility or other Murfitts Industries facilities to achieve the Facility's specifications. The main requirements are;

- Metal and fabric components are removed
- Particle size is $\leq 10\text{mm}$
- Crumb is dry

3.2.3 The crumb will not require any further treatment before it is fed into the pyrolysis process.

3.2.4 A full list of waste types to be accepted onto the proposed facility are listed in Table 3.2.1 below.

Table 3.2.1: Proposed Feedstock and EWC Waste Types

Murfitts Industries Limited - EWC List	
Waste Code	Description
19	WASTES FROM WASTE MANAGEMENT FACILITIES, OFF-SITE WASTE WATER TREATMENT PLANTS AND THE PREPARATION OF WATER INTENDED FOR HUMAN CONSUMPTION AND WATER FOR INDUSTRIAL USE
19 12	Wastes from the mechanical treatment of waste (for example sorting, crushing, compacting, pelletising) not otherwise specified
19 12 04	Plastic and Rubber (shredded or granulated rubber from end-of-life tyres only)

3.3 Pre-Acceptance Procedures

3.3.1 The only waste types to be accepted onto the Facility is crumb from shredded end-of-life tyres. The majority of feedstock will be delivered from the neighbouring end-of-life tyre treatment facility. As the ELT facility is also operated by Murfitts Industries Limited waste will be weighed on that weighbridge to ensure records are maintained. Waste will be delivered in Big Bags.

3.3.2 If the neighbouring ELT facility is unavailable, tyre crumb will be imported from other Murfitts Industries operated facilities. The supply contracts between the facilities will state the specification of the crumb which will be delivered to the Facility. Waste will be delivered in the same way, i.e. in Big Bags.

3.3.3 All waste deliveries to the Facility will be subject to pre-acceptance evaluation prior to arrival on site, which will be linked to the physical and chemical composition of the waste.

3.3.4 The following information will be recorded:

- Waste EWC Code;
- Process generating SIC code;
- Delivery container type;
- Written description of the material;
- Representative waste analysis (for any new unfamiliar waste streams): and
- Anticipated date and time of delivery.

3.3.5 Feedstock will not be accepted until the Operator is confident that the Facility is able to receive the load, and that the nature of material can also be processed without operations impacting any nearby sensitive receptors or compromising the plant's operational performance and management controls. Given that the incoming waste will be from a facility under the control of the same company, management of feedstock input and quality should be optimised.

3.3.6 There will be no ad-hoc feedstock deliveries. If an unscheduled waste delivery arrives on site and it is verified that there has been no prior arrangement made for the delivery, the delivery will be rejected, vehicle turned away, and the incident recorded.

3.3.7 All delivery vehicles entering the Facility will report to the site office to complete waste Duty of Care paperwork checks, and waste carrier registration if applicable.

3.3.8 To fulfil Duty of Care requirements, waste brought to the site must be accompanied by a waste transfer note which includes the source location and description of the waste they are carrying. A copy of these notes will be held at the site office.

3.4 On-site Waste Acceptance Reception

3.4.1 Waste Acceptance and Pre-Acceptance Procedures will be in place to control deliveries of crumb and inputs in conjunction with the adjacent ELT facility also operated by Murfitts Industries Limited. The risk of accepting any non-confirming loads is therefore minimal and will be controlled by these measures.

3.4.2 Delivery of waste and collection of output materials will occur 24 hours per day 7 days per week.

3.4.3 The treatment of the waste feedstock through the pyrolysis process, operation of the boiler and upgrading of the syngas will operate continuously 24 hours a day.

3.4.4 The bags of tyre crumb will be weighed when leaving the adjacent site or delivered from other Murfitts operations and weights will be provided as part of legal requirements under Duty of Care.

3.4.5 Whilst unlikely, if on arrival to site, any load is not acceptable under the terms of the Permit or agreed specification, entry to the site will be refused.

3.4.6 Where the site operative is not satisfied with the paperwork provided or description of the incoming material, the vehicle will either be directed to a holding area on site pending further information/inspection or will be rejected and a rejected load form completed, a copy of which will be given to the driver. Should the driver have already unloaded the material, the

material will be re-loaded onto the vehicle, the appropriate paperwork completed and waste removed from site.

- 3.4.7 Feedstock deliveries will only be accepted when there is sufficient space for storage of the feedstock. This can be easily controlled as feedstock deliveries from the adjacent ELT facility will managed on a 'just in time ' basis.
- 3.4.8 Acceptable loads will be off-loaded into the pyrolysis building for temporary storage prior to loading into the conveyor to be inputted into the pyrolysis process. The pyrolysis building is fitted with fast acting roller shutter doors and operated under negative pressure.
- 3.4.9 The outside areas of the facility will be serviced with an impermeable surface.
- 3.4.10 Storage of feedstock will typically be limited to 4 tonnes stored within big bags within the pyrolysis building. When the neighbouring ELT plant is unavailable, bags of tyre crumb will be sourced from another of Murfitts Industries Limited's permitted facilities. In the case of this operation a curtain sided lorry will deliver 24 tonnes of tyre crumb to ensure the pyrolysis plant can continue operations and the trailer be stood on impermeable surface.

3.5 Start-up and Shut Down Procedures

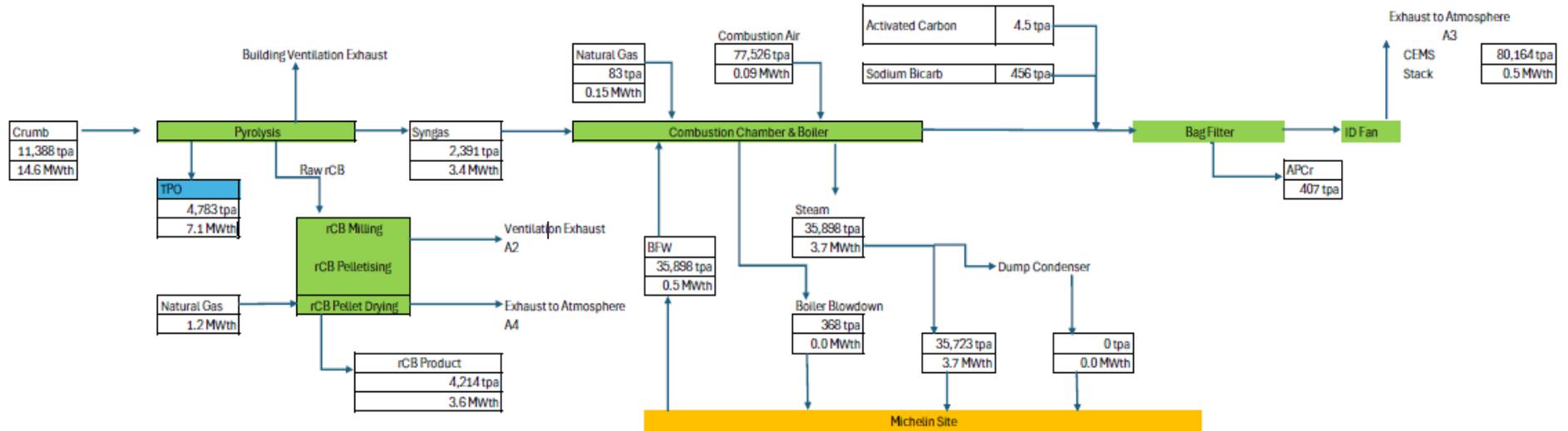
- 3.5.1 The Standard Operating Procedure (SOP) for the start-up and shut down of the facility can be found in Appendix B to this document.

3.6 Heat and Mass Balance

- 3.6.1 Figure 3.11.1 below shows the Heat and Mass Balance for the plant. A copy can also be found in Drawings section of this application.



Summary Heat & Mass Balance for Project Triumph Pyrolysis System For SWIP Permitting



Energy Balance			
Inputs		Outputs	
Crumb	14.6 MWth	Steam to Helix	0.0 MWth
Natural Gas	0.15 MWth	TPO	7.1 MWth
Boiler Feedwater	0.50 MWth	rCB	3.6 MWth
Combustion Air	0.09 MWth	Steam to Michelin	3.7 MWth
Pyrolysis Elec Power	0.55 MWth	Boiler Blowdown	0.0 MWth
		Condensate	0.0 MWth
		Fibre	0.0 MWth
		Flue Gas	0.5 MWth
		Losses	1.0 MWth
Total	15.8 MWth	Total	15.8 MWth

Mass Balance			
Inputs		Outputs	
Crumb	11,388 tpa	Fibre	0 tpa
Combustion Air	77,526 tpa	Steel	0 tpa
Activated Carbon	5 tpa	TPO	4,783 tpa
Sodium Bicarb	456 tpa	rCB	4,214 tpa
Natural Gas	83 tpa	APCr	407 tpa
		Flue Gas	80,164 tpa
Total	89,458 tpa	Total	89,568 tpa

3.6.2 The mass balance of the plant running on tyre crumb is presented in Table 3.7.1 below. The overall energy balance for the plant can be found in Table 3.7.2 below.

Table 3.12.1: Mass Balance

Mass Balance			
Inputs		Outputs	
Tyre Crumb	11 388 tpa	TPO	4783 tpa
Combustion Air	77 526tpa	rCB	4214 tpa
Activated Carbon	5tpa	APCr	407 tpa
Sodium Bicarbonate	456tpa	Flue Gas	80 164 tpa
Natural Gas	83tpa		

Table 3.12.2: Energy Balance

Energy Balance			
Inputs		Outputs	
Tyre Crumb	14.6MWth	TPO	7.1MWth
Natural Gas	0.15MWth	rCB	3.6MWth
Boiler Feedwater	0.50MWth	Steam to Michelin	3.7MWth
Combustion Air	0.09MWth	Boiler Blowdown	0.0MWth
Pyrolysis Electrical Power	0.55MWth	Condensate	0.0MWth
		Fibre	0.0MW
		Flue Gas	0.5MWth
		Losses	1.0MWth

3.7 Residues – Minimisation and Disposal

- 3.7.1 IED requires that residues are minimised in their amount and harmfulness and that they should be recycled, where appropriate, directly in the plant. In the case of pyrolysis plants, residues include char, pyrolysis oils, spent scrubbing media for syngas clean up and dust.
- 3.7.2 The pyrolysis oil (TPO) will be collected within tanks on-site and sent off site for use as refinery feedstock.
- 3.7.3 The raw rCB (char) is cooled bagged and either sent to end users or milled and pelletised on site to create a product.
- 3.7.4 The APCR residues are collected in bags and stored within a building before being taken off site for further disposal at an appropriately permitted facility.
- 3.7.5 Full details of residues produced, storage on site and fate can be found in Appendix A.

3.8 Energy Recovery

- 3.8.1 The primary purpose of the Facility is to provide liquid refinery feedstock, recovered carbon black and steam to decarbonise the activities undertaken by the neighbouring Michelin Tyre Retreading Facility.
- 3.8.2 The waste tyre generated syngas is being combusted for use in a boiler to provide steam therefore the heat is being recovered.

3.8.3 The energy balance for the plant is described in table 3.12.2 above.

3.9 Combustion Temperature and Residence Time

3.9.1 The Industrial Emissions Directive CHIV and PG13/1 require plants to be designed, equipped, built and operated in such a way that the gas resulting from the incineration or co-incineration of waste is raised in a controlled and homogenous way and even under the most unfavourable conditions to a temperature of 850°C for at least two seconds.

3.9.2 The syngas combustion chamber is sized to allow 2 seconds of residence time of the flue gas after the last injection of air at 850°C. Temperatures are monitored.

3.9.3 Calculations to demonstrate achievement with the residence time are provided in Appendix G.

3.10 Prevention of Accidents

3.10.1 An assessment of the prevention of accidents and measures to reduce the risk of them occurring has been undertaken in line with the Environment Agency's risk assessment overview and supporting risk assessment guidelines. The assessment is included within Appendix A of the 'Environmental Risk Assessment', referenced CRM 0180 001 PE R 005 (ERA) which forms part of this Permit Application.

3.10.2 The site-specific ERA submitted with this application identifies the potential hazards posed by the facility under both normal and abnormal operating conditions. An assessment of each hazard identified has been evaluated and the potential risk and prevention measures described. Possible accidents to be addressed are summarised below:

- Waste storage failure;
- Incoming waste or raw material handling/storage failure;
- Fire;
- Power Failure;
- Vandalism;
- Vehicle Accident; and
- Residues handling/storage failure.

3.10.3 The assessment in the ERA concluded that the risk from accidents to the environment is 'low' taking into account control measures to be put in place.

3.10.4 Operational procedures which identify the actions to be taken to minimise the potential causes of accidents, and the consequences in the event of an accident occurring will be implemented through the EMS. Such actions will include:

- A programme of site inspections for all environmentally critical plant and equipment.
- Planned preventative maintenance.
- Operating equipment in accordance with manufacturer's specifications.

- Establishment and maintenance of a list of substances on site that have the potential to cause environmental impact if they escape; and,
- Review of operational procedures.

3.10.5 All personnel will be provided with suitable training to ensure they are familiar with the site's Environmental Management System procedures, which will include training for both normal and abnormal scenarios, and their individual responsibilities in the event of an incident.

3.11 Site Security

3.11.1 Access to the site will be restricted. The main processing areas are located within the main building which is located within a lockable secure compound provided with a metal security fence, with a hinged gate, which also incorporates the neighbouring permitted waste facility which is also operated by Murfitts Industries Limited.

3.11.2 The pyrolysis building will be secured when unoccupied.

3.11.3 The site will benefit from 24/7 security.

3.12 Training and Competency

3.12.1 Training will be provided to all employees by suitably qualified and competent staff, in all aspects of the operation and maintenance of the facility and in accordance with an agreed training plan. Operatives will be subject to training in line with site operating procedures and industry standards. Regular tool-box talks will be held to ensure that all relevant staff are aware of the requirements of the Permit and their associated duties.

3.12.2 Training will ensure that all personnel are familiar with the site's Environmental Management System procedures and the Environmental Permit. Training will cover both normal and abnormal scenarios, and the individual responsibilities for key personnel in the event of an incident.

3.12.3 All new staff and visitors will undergo appropriate levels of induction prior to commencing any activities on site. Operational staff will have their duties restricted until they have obtained relevant in-house and/or externally provided training and certification.

3.12.4 The Technically Competent Manager for the facility will have at least one of the following qualifications;

- WAMITAB Level 4: Certificate in Waste and Resource Management to include the optional module on thermal treatment VRQ408; and/or,
- WAMITAB Level 4: Operator Competence for Managing Thermal Treatment Facilities.

3.13 Environment Management System

3.13.1 Murfitts Industries Limited already have in place an Environmental Management System (EMS). This will be reviewed on an ongoing basis to ensure it is applicable to all relevant activities to be undertaken at the facility.

3.13.2 The overall objective of the EMS will be to establish a systematic approach to reduce the impact of the environmental aspects which the Operator can control or influence. The EMS will make reference to ISO14001 standards in that it will be established, documented, implemented, maintained and audited.

3.13.3 Procedures within the EMS will ensure policies are fully implemented and are auditable.

3.14 Decommissioning and Closure

3.14.1 The Operator will prepare a Site Closure Plan which will describe how the site will be decommissioned to return it to a satisfactory state following cessation of operations. Records will be maintained of the location of facilities, infrastructure and storage containing potentially pollution chemicals, as well as the services and surface structures installed during the operating phase of the plant.

3.14.2 De-commissioning will be in compliance with procedures outlined in the Site Closure Plan. During the de-commissioning process, operational records will be reviewed. If areas of deterioration during the operation of the site are identified these areas will be re-examined; remediation undertaken if required; and the site returned to a satisfactory state as defined at the Permit application stage.

3.14.3 Upon Completion of the De-commissioning phase, a Permit Surrender Application will be submitted to the Local Authority to surrender the Permit.

4.0 Emissions and Abatement

4.1 Introduction

4.1.1 This section of the report describes the emissions from the Facility, both point source and fugitive, and the controls in place to prevent or minimise their release.

4.1.2 An Environmental Risk Assessment (ERA) has also been prepared to support the application, which describes the impact of emissions to air, water and land.

4.2 Point Source Emissions to Air

4.2.1 There will be three main point source emissions to air from the proposed plant during normal operations:

- Emissions Point A1 arising from the pneumatic transport of the rCB
- Emissions Point A2 which takes emissions from the boiler and flue gas treatment
- Emissions Point A3 which takes emissions from the rCB drying exhaust

4.2.2 During abnormal operations, there will also be an emission point from the emergency diesel generator and the emergency flare.

4.2.3 The flare will be utilised during abnormal operations to allow syngas to be safely combusted and released to atmosphere for example in the event of an unplanned equipment failure.

4.2.4 Details of all emission points are listed in Table 4.1.1 below and are also marked on the Site Layout Plan referenced, CRM 0180 001 PE R 002.

Table 4.1.1: Point Source Emissions to Air

Air Emission Point Reference	Source of Emission	Basis for release	Emissions
A1	rCB pneumatic transport	Normal operation	Particulates
A2	Exhausts from Boiler	Normal operation	CO, CO ₂ , PM, NO _x , SO _x , TOC, HCL, HF, PAHs
A3	rCB drying exhaust	Normal operation	Particulates
A4	Emergency Flare	Abnormal operation	CO, NO _x , SO _x , TOC, HCL, HF, PAHs
A5	Emergency Generator	Abnormal operation	NO _x , SO _x , particulates
Pressure Relief Valves (PRVs)	Steam system boiler	Periodic Release	Steam
Vents	TPO tanks	Periodic release	VOCs

rCB Pneumatic Transport Exhaust

4.2.5 The emissions from the pneumatic transport exhaust will be passed through a bag filter which will reduce particulates down to 10mg/Nm³.

Boiler Exhaust

- 4.2.6 The emissions from the boiler and flue gas treatment are emitted from a 25m high stack. Emissions from the boiler and flue gas treatment are assessed in the ERA and in the Air Quality Assessment (AQA.) The stack height was determined by the AQA. At the height of 25m, emissions are adequately dispersed with no significant impact on receptors or exceedances of Air Quality Standards or Environmental Assessment Levels. See the AQA and ERA for further details.
- 4.2.7 Operation under the Environmental Permitting Regime prioritises the prevention of emissions to the environment by primary clean-up techniques rather than abatement by secondary techniques.
- 4.2.8 An emissions monitoring programme, compliant with IED CHIV and Annex VI is presented in Section 5.0, including Annex VI limits.

rCB Drying Exhaust

- 4.2.9 The emissions from the rCB drying process are emitted from a stack 3m above building ridge height and approximately 18m high. Emissions from the rCB drying exhaust stack are assessed in the ERA and the AQA.
- 4.2.10 Emissions will be passed through a bag filter which will reduce particulates down to 10mg/Nm³.

4.3 Emissions to Surface Waters or Groundwater

- 4.3.1 There shall be no point source emissions to groundwater, the entire site benefits from concrete hardstanding and sealed drainage.
- 4.3.2 There will be a point source emission to surface water consisting of clean surface water from non-process areas and roofs. Clean surface water run-off will be stored within a crate system and released at a specified rate to the River Trent via an interceptor.

4.4 Emissions to Sewer

- 4.4.1 Boiler blowdown and condensate are piped over to the neighbouring Michelin site as part of the shared steam services. These streams are then discharged to the foul sewer operated by Severn Trent Water.

4.5 Emissions to Land

- 4.5.1 There will be no point source emissions to land from the proposed plant.

4.6 Waste Generation and Minimisation

- 4.6.1 The plant will give rise to four waste streams generated at various stages of the process.
- 4.6.2 The wastes produced by the plant are as follows:
- Condensate
 - Blowdown
 - APCr

- Rejected tyre crumb

4.6.3 As stated, blowdown and condensate are automatically directed to the adjacent Michelin site's storage tank before being discharged to sewer via a trade effluent consent.

4.6.4 APCr is collected as described in section 2.6 above and sent off site for disposal at an appropriately permitted facility.

4.6.5 The likelihood of tyre crumb being rejected is deemed as being minimal as the crumb is provided by other Murfitts Industries operated facilities to a defined specification. However, rejection procedures are described in section 3.3 above.

4.7 Noise

4.7.1 The primary potential sources of noise will be from the combustion unit, boiler and flue gas treatment and in particular the fan sets, which will be housed in acoustic enclosures to ensure the modelled noise emissions are achieved. The pyrolysis plant and associated plant and equipment are located within the site building.

4.7.2 The flare and emergency generator are only operated in the case of abnormal operations and in an emergency.

4.7.3 A noise impact assessment has been prepared by Enzygo Limited, a copy of which can be found in the environmental risk assessment, which has been submitted as part of this Permit application. The assessment demonstrates that the impacts of the noise generated from the proposed operations are not significant.

4.8 Fugitive Emissions to Air

4.8.1 The primary potential sources of fugitive emissions to air will be dust from handling the tyre crumb which may escape from the building when the roller shutter doors are opened. Dust may also be generated from vehicle movements across the outside yard areas.

4.8.2 Tyre crumb is delivered in sealed big bags directly into the pyrolysis building as described in section 2.2 above.

4.8.3 Thermal treatment of all feedstock material will be restricted to within the pyrolysis unit which is enclosed.

4.8.4 Feedstock is accepted onto the site under strict waste acceptance procedures described in sections 3.2, 3.3 and 3.4 above. These procedures ensure that only suitable and permitted waste types are accepted onto the site.

4.8.5 Routine housekeeping checks, inspections and regular maintenance will be undertaken to minimise the risk of fugitive emissions to air. The approach taken on site will be to implement measures following a preventative rather than cure approach.

4.9 Fugitive Emissions to Surface Waters, Ground and Groundwater

4.9.1 The Facility will use existing and new infrastructure which has been engineered to provide sealed impermeable surfacing to ensure that there will be no fugitive emissions released to surface water, ground or groundwater.

4.9.2 All above ground tanks will have:

- Impermeable bunds with a capacity of 110% of the largest volume;
 - Fill points provided with secondary containment;
 - Be subject to regular visual inspection; and
 - Spill kits – materials suitable for absorbing and containing minor spillages will be readily available on site.
- 4.9.3 Details of all raw materials and chemicals to be used on-site, along with the proposed containment and mitigation measures are provided in Appendix A of this document.
- 4.9.4 Routine housekeeping checks and inspections of secondary containment measures will be undertaken to minimise the risk of any spillages. The approach taken on-site will be to implement measures following a preventative rather than cure approach.

5.0 Site Monitoring Plan

5.1 Overview

5.1.1 This section describes the proposed monitoring arrangements which will be implemented at the Facility.

5.1.2 Each part of the plant will have its own control system, these systems are listed below:

- Pyrolysis
- Raw rCB cooling and bagging
- Raw rCB milling, pelletising and drying
- Syngas combustion, steam generation and flue gas cleaning
- TPO storage and loading.

5.1.3 The plant's overall control system will integrate each of these packages and also provide the ability to monitor emissions to air, from the syngas combustion, steam generation and flue gas cleaning elements. There are no emissions from the pyrolysis process as it is fully enclosed. Emissions to air produced by the process will be continuously monitored in line with the requirements of the Environmental Permitting Technical Guidance PG13 Small Waste Incineration Plants (Draft) (PG13) and the Industrial Emissions Directive.

5.1.4 The plant's emissions to air will be monitored by a Continuous Emissions Monitoring System (CEMS).

5.1.5 Monitoring equipment, techniques, personnel and organisations employed to assist with the monitoring program will have either MCERTS certification or MCERTS accreditation (as appropriate).

5.1.6 Procedures will be prepared for the monitoring of all emissions prior to the site being commissioned.

5.1.7 The Environmental Permit will confirm the required monitoring schedule for the Facility, however, the proposed monitoring arrangements are as follows.

5.2 Emissions to Air

5.2.1 As stated in Section 4, there are three main point source emissions to air arising from:

- the 18m high stack from the pneumatic transport stack referenced as emission point A1;
- the 25m high stack discharging the flue gasses from the boilers combustion unit referenced as emission point A2;
- the 18m stack from the rCB drying exhaust, emissions point A3.

5.2.2 In addition to the main emission points there is one other emission point from the flare utilised at start up and shut down and, in the case of an emergency, and also a back up diesel generator.

5.2.3 Table 5.2.1, 5.2.2 and 5.2.3 below present the proposed emission limit values, from emissions point A1 in accordance with regulatory standards.

Table 5.2.1: Point Source Emissions and Monitoring

Air Emission Point Reference	Source of Emission	Emissions	Proposed BAT-AEL Values mg/Nm ³	Monitoring Frequency	Monitoring Method
A2	Combustion Unit of Boiler, see Tables 5.2.2 and 5.2.3				
A1 ad A3	Pneumatic transport exhaust rCB drying exhaust	TVOC, Particulates	TVOC 10-30 Dust 10	Annually	General EN 13284-1
A4	Emergency Flare	CO, NOx, SOx, TOC, HCL, HF, PAHs	NA, emergency use only	NA	NA
A5	Emergency Generator	NOx, SOx, particulates	NA, emergency use only	NA	NA
Pressure Relief Valves (PRVs)	Steam system boiler	Periodic Release	Steam	NA	NA
Vents	TPO tanks Lourves from the pyrolysis building	Periodic release	Particulates	NA	NA
<p>Note 1: Reference conditions: temperature of 273,.15K, a pressure of 101.3kPa and after correction for the water vapour content of the waste gases and at a standardised oxygen content of 15%.</p> <p>Note 2: Reference conditions: dry gas at a temperature of 273.15K and a pressure of 101.3kPa, without correction for oxygen content, and expressed in mg/Nm3.</p>					

Table 5.2.2: Emissions Monitoring A2 (Combustion Unit of Boiler) Continuous Monitoring Requirements

Substance/ Parameter	Emission Limit Value (mg/Nm ³) [4]				Backstop ELV [3] (mg/Nm ³) Half-hour average
	Daily average	Half-hourly average [1]		10-Minute average [3]	
		100%	97%		
Carbon Monoxide [2]	75	150	N/A	225	150
Total Dust	15	45	15	N/A	225
Oxides of Nitrogen	300	600	300	N/A	N/A
Sulphur dioxide	75	300	75	N/A	N/A

Substance/ Parameter	Emission Limit Value (mg/Nm ³) [4]				Backstop ELV [3] (mg/Nm ³) Half-hour average
	Daily average	Half-hourly average [1]		10-Minute average [3]	
		100%	97%		
TOC	15	30	15	N/A	30
HCl	15	90	15	N/A	N/A
HF	1.5	6	3	N/A	N/A

- The regulator may choose which limit to apply, either 100% compliance with the higher value or 97% compliance with the lower value.
- In the case of CO emissions, 95% compliance with the 10-minute average of 225 mg/Nm³ is an alternative to 100% compliance with the half hour limit of 150 mg/Nm³. In which case, this will also be the backstop ELV.
- The backstop ELV applies during periods when the half-hourly ELV is exceeded.
- Reference conditions: All emission limit values shall be calculated at a temperature of 273.15 K, a pressure of 101.3 kPa, 6% oxygen and after correcting for the water vapour content of the waste gases.

Table 5.2.3: Emission Point A2 (Combustion Unit of Boiler) Periodic Monitoring Requirements

Substance/ Parameter	Emission Limit Value [4]	Averaging / Sampling period
Sulphur dioxide	75 mg/Nm ³	Average over the sampling period
HCl	15 mg/Nm ³	
HF	3 mg/Nm ³	
Cd and Tl	Total: 0.05 mg/Nm ³	Average emission limit values [1] over a sampling period of a minimum of 30 minutes and a maximum of 8 hours A minimum sampling period of one hour is recommended.
Hg	0.05 mg/Nm ³	
Sb, As, Pb, Cr, Co, Cu, Mn, Ni and V	Total: 0.5 mg/Nm ³	
Dioxins and furans [2]	0.1 ITEQ ng/Nm ³	Average emission limit value over a sampling period of a minimum of 6 hours and a maximum of 8 hours.
Dioxin-like polychlorinated biphenyls	No limit specified	
Polycyclic aromatic hydrocarbons (PAHs) [3]	No limit specified	

- These average values cover also the gaseous and the vapour forms of the relevant heavy metal emissions as well as their compounds.
- The emission limit value refers to the total concentration of dioxins and furans calculated in accordance with the toxic equivalence factors shown in table 5.4 of PG13.
- The term PAHs refers to the sum of the following PAH compounds: acenaphthene, acenaphthylene, anthracene, benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(g,h,i)perylene, benzo(k)fluoranthene, chrysene, dibenzo(a,h)anthracene, fluoranthene, fluorene, indeno (1,2,3-cd)pyrene, naphthalene, phenanthrene and pyrene.

Substance/ Parameter	Emission Limit Value [4]	Averaging / Sampling period
4. Reference conditions: All emission limit values shall be calculated at a temperature of 273.15 K, a pressure of 101.3 kPa, 6% oxygen and after correcting for the water vapour content of the waste gases.		

5.3 Derogation to Monitoring Requests

5.3.1 The air quality assessment which accompanies this application demonstrates that emission limits for PCB's and PAH's are modelled as being insignificant. In line with section 5.1.3 of the draft *Environmental Permitting Technical Guidance PG13 Small Waste Incineration Plants*, the Operator would request that this means periodic measurement is not required.

5.3.2 The air quality assessment also showed that the predicted long and short term impacts on human and ecological sensitive receptors of SO₂, HCl, HF were insignificant and within the prescribed emissions limits. Therefore the applicant would suggest that periodic monitoring of these emissions would be adequate.

5.4 Process Monitoring Requirements

5.4.1 As mentioned above plant will have a computer-based system in place to monitor emissions quality and flow. This supervisory control and data acquisition (SCADA) software will operate continuously gathering and analysing real time data.

5.4.2 In accordance with IED requirements, the following process/operational parameters will be monitored:

- Operational run-time hours;
- Steam flow;
- Steam temperature;
- Exit gas temperature;
- Mass of daily and weekly throughputs;
- Abnormal/emergency operations;
- Raw material usage;
- Energy consumption of the plant.

Waste Streams Generated

- Mass quantities of all wastes removed from site; and
- Fate of waste streams i.e. sent for recovery or disposal.

6.0 Records and Reporting

6.1 General Overview

6.1.1 The operator will ensure that the following information is recorded:

- As built design for newly constructed/developed areas and any changes throughout the operation;
- Site inspections by the operator or regulating body and any subsequent issues and corrective actions taken;
- Staff training matrix and records;
- Schedule and records of maintenance of plant and equipment;
- Emergencies;
- Complaints and actions taken;
- Plant/equipment failure;
- Waste acceptance procedure;
- A record of all waste accepted onto the site including EWC code, quantity, description, and source;
- A record of any rejection of feedstock / raw materials;
- Records relating to pre-acceptance for cross-reference and verification at the end-of-life tyre and shredded tyre acceptance stage;
- Emissions monitoring:
- Any Incidents/accidents on site and actions taken;
- Security failures;
- Severe weather conditions;
- End-of-life and shredded tyres accepted and rejects and residue dispatched from the site;
- Monitoring records as required by the Permit;
- Local Authority Inspection Reports; and
- Details of emissions / reportable incidents in accordance with the Permit.

6.1.2 All records will be made available on request. All records, which are required under the condition of the Permit, will be maintained and kept secure from loss, damage or deterioration. Any records held electronically will be backed up on a regular basis.

6.2 Reporting

- 6.2.1 A summary of the end-of-life and shredded tyre quantities received and residues removed from the site will be made at the frequencies and in a format to be agreed with the Local Authority.
- 6.2.2 Once the facility is commissioned the operator shall inform City of Stoke-on-Trent Council immediately of the following events:
- Any incident or accident significantly affecting the environment;
 - A breach of Permit conditions
 - For continuous monitoring;
 - If any daily average emission limit value for emissions to air is exceeded;
 - If any half-hour average emission limit value for emissions to air is exceeded for more than 4 hours uninterrupted or for more than 60 hours in total;
 - For periodic emissions monitoring;
 - If any emission limit value for emissions to air is exceeded.
- 6.2.3 Reports will be submitted to City of Stoke-on-Trent Council using the appropriate reporting forms as required

Appendix A – Storage and Use of Potentially Polluting Materials

Product	Units	Estimated Annual Use / production	Maximum On-site Storage Capacity	Storage Arrangements	Fate	Environmental Impact	Alternative
Tyre crumb (input material)	Tonnes	11,388	4 tonnes usual storage limit however if the adjacent facility is unavailable this maximum would increase to 24 tonnes.	Delivery bags. Within pyrolysis building. When the ELT crumbing line from the neighbouring site is available crumb will only be sourced from other Murfitts run facilities and would be brought in, in big bags on a curtain sided trailer and stored next to the pyrolysis plant. The trailer would contain a maximum of 24 tonnes of crumb.	Feedstock for process. Pyrolysed.	Microplastics may be released if not handled carefully.	Specific purpose of the facility is to utilise end -of-life tyres as an alternative fuel to natural resources. Other feedstocks likely to have similar or increased environmental impacts.
Activated Carbon (raw material)	Tonnes	4.5	1	Big bags in secure storage facility.	Used in flue gas treatment system	Flammable. R36: Irritating to the eyes.	None
Tyre pyrolysis oil (product)	Tonnes	4,783	50 t	Stored in 2no fixed tanks each with a capacity of 26m ³ . Equating to 48 tonnes of TPO. Also a small amount of product inventory of approximately 2 tonnes.	Sold as product.	R40: Carcinogenic R10: Flammable Harmful to aquatic life Slight to moderate irritant	None

Product	Units	Estimated Annual Use / production	Maximum On-site Storage Capacity	Storage Arrangements	Fate	Environmental Impact	Alternative
				One tank is emptied into a road going tanker and leaves site per day		Affects central nervous system Harmful or fatal if swallowed Produces vapours	
Raw rCB	Tonnes	4214	28	Stored in big bags each with a capacity of 2m ³ . Up to 4no bags equating to 4 tonnes of raw rCB will be stored within the pyrolysis building. Bags are transferred to the rCB processing plant or loaded onto a trailer for transfer to end users	Cooled, bagged and either transferred to the rCB Processing plant or sold to end users as a product.	May generate dust causing irritation.	Alternatives have similar effects
Finished rCB	Tonnes	4214	28	Stored in big bags each with a capacity of 2m ³ . Up to 4no bags equating to 4 tonnes of finished rCB will be stored within the rCB processing building. Bags are placed onto trailers which hold 24 big bags equating to 24 tonnes of rCB	Sold to end users as a product.	May generate dust causing irritation.	Alternatives have similar effects

Product	Units	Estimated Annual Use / production	Maximum On-site Storage Capacity	Storage Arrangements	Fate	Environmental Impact	Alternative
APCR (waste)	Tonnes	407	10	Stored in big bags within a dedicated building	Disposed of by authorised waste contractor	Classed as hazardous waste, similar to conventional APCr. R36: Irritating to the eyes.	None
Sodium Bicarbonate	Tonnes	456	10	Stored within Big bags within a dedicated building	Utilised in flue gas treatment system	Causes eye irritation Inhalation – slight irritation to nose Ingestion – ingestion of large quantities may cause nausea and vomiting.	N/A
Maintenance and cleaning fluids	Litres	Variable (as required)	Variable (as required)	Product containers in secure storage facility. Small quantities.	Used during maintenance / cleaning activities	Various	None
Diesel	Litres	Variable	As process inventory	Will be brought to site and loaded directly into the TPO scrubber sump and stored as a process inventory	Used on start up when TPO inventory is nil. Diesel circulates within scrubbing system, gradually being replaced by TPO.	R40: Carcinogenic R10: Flammable Hazardous to aquatic life Fatal if enters airways Skin irritation	N/A

Product	Units	Estimated Annual Use / production	Maximum On-site Storage Capacity	Storage Arrangements	Fate	Environmental Impact	Alternative
					This is expected to be a first time, commissioning, start up requirement of approx. 2,000l and would only be required on the infrequent requirement to empty the systems TPO inventory.	damage to organs through prolonged or repeated exposure	
Diesel	Litres	50	970	Bunded tank integral to packaged/ containerised diesel generator	Used during abnormal operations to fuel the generator	R40: Carcinogenic R10: Flammable Hazardous to aquatic life Fatal if enters airways Skin irritation damage to organs through prolonged or repeated exposure	N/A
Engine oil	Litres	75	150	Typically removed from site as waste on oil change during generator service.	Emergency generator lubrication	R40: Carcinogenic R10: Flammable Harmful to aquatic life	N/A

Product	Units	Estimated Annual Use / production	Maximum On-site Storage Capacity	Storage Arrangements	Fate	Environmental Impact	Alternative
				Fresh oil held in storage container along with other maintenance materials.		Slight to moderate irritant Affects central nervous system Harmful or fatal if swallowed Produces vapours	
Nitrogen	m ³	6000	1	Generated on site using PSA unit. Stored in a 1m ³ accumulator within pyrolysis building at approx. 7barg.	Purge gas with pyrolysis and blanketing gas in TPO storage tanks		None
Water/Glycol	m ³	0.1	10	Process inventory within cooling system 70% water 30% Ethylene glycol	Closed loop cooling system		N/A
Ethylene Glycol	m ³	0.25	0.03	storage container along with other maintenance materials	To allow top up of the closed loop cooling system	Acute toxicity (oral) May cause damage to organs (kidney) through prolonged or repeated exposure (if swallowed)	N/A

Appendix B – Start Up and Shut Down Procedures

Start-up Procedures

Prior to the plant being able to proceed with an automatic start up, all plant permissive equipment and all package controllers will be set in an available condition. Plant permissive equipment includes the tyre crumb feed isolation valve which will be held in the closed position and the rotary valve and pyrolysis feed screw is stopped to prevent feeding of tyre crumb during initial start-up. The operator will initiate the plant's start-up cycle via the control system. This cycles the syngas to boiler isolation valve to open and closed limit positions to prove its operation and starts the boiler feedwater pumps. Then initiates the natural gas burner, combustion air fans and main ID fan the combustion chamber. The burner uses natural gas as fuel, which is adjusted to give controlled and steady rate of temperature increase in the waste gas combustor, residence chamber and downstream boiler. The pyrolysis screws will also commence warm up albeit in an empty state. The temperature of the combustion chamber is measured at multiple points on the inner wall of the vessel. When the temperature has been held above 850°C, the control system will provide a prompt for the operator to commence feeding of tyre crumb into the pyrolysis chamber.

When the operator initiates tyre crumb feed, the tyre crumb isolating valve is opened and the rotary valve and pyrolysis feed screw starts rotating. Tyre crumb is fed into the pyrolysis chamber. The tyre crumb starts to pyrolyse, breaking down into pyrolysis gas and char. The pyrolysis gas passes through the quench system, with the TPO dropping into the liquid phase. The remaining pyrolysis gas is passed to the combustion chamber.

The pyrolysis gas entering the combustion chamber is exposed to the natural gas flame and air, causing it to combust. As the quantity of pyrolysis gas increases the natural gas burner is turned down and the combustion air fan, which provides dilution air for temperature control, is adjusted to maintain a temperature at the exit of the combustion and residence chamber in excess of 850C. The natural gas burner will be used to maintain an anchor flame within the combustion chamber, ensuring the pyrolysis gas is combusted. When the temperature of the combustion gas leaving the combustion and residence chamber has stabilised and the natural gas burner is at its minimum operating duty startup has reached completion.

Shut Down Procedures

There are two types of shutdown procedures: the first being a controlled shutdown; the second an emergency shutdown procedure.

- Under a controlled shut down the operator will request the plant to stop via the control system. On initiation of the shutdown sequence, tyre crumb feeding screw and rotary valve will stop and the isolation valve moved to the closed position. The natural gas fuelled burner will ramp up as pyrolysis gas generation reduces to ensure temperatures in the combustion and residence chamber remain in excess of 850C. The natural gas burner will remain on until the production of pyrolysis gas has ceased and the pyrolysis system has been purged.
- The pyrolysis screw continues to run, until all feed stock has been removed. This is a function of time and expected to be 45mins to 1 hour. Once the system is empty a nitrogen purge will be initiated, ensuring all remaining pyrolysis gas is flushed from the system into the combustion and residence chamber. After completion of the nitrogen purge the combustion air fan will be ramped up to full speed and left to run for a defined period of time to ensure the combustion system has been fully flushed through. On completion of the purging process the burner, combustion air fan and ID fan will be switched off.

- Emergency shutdown will be initiated either via manual intervention by the operator, or via automated signalling through emergency alarms. Emergency shutdown will cause the tyre crumb isolation valves to close. Once the isolation valves are in the closed position the feeding of tyre crumb will cease.
- The control system will manage emergency shutdown events to ensure the plant is shut down safely controlling risk to operators and the environment. In an emergency shutdown event there are two potential conditions.
- If the pyrolysis or syngas quench system fails, the feed to the system is isolated and a nitrogen purge is initiated. The combustion and boiler system will continue to process the syngas and enter a controlled shutdown.
- If the combustion, boiler, steam system or flue gas treatment system fail. The feed to the pyrolysis system is isolated and the pyrolysis system allowed to empty of solid material as the syngas generation reduces to nil. The syngas isolation valve (to the boiler) is closed causing the syngas to flow through the water seal and to the flare, where it is combusted and released to atmosphere.

An emergency diesel powered generator is included within the equipment to service the load requirements if the mains power electricity should fail for any reason. This will ensure that the motors and fans can be continuously employed and ensure that emergency shutdown procedures can be followed in event of a power outage.

Appendix C - Contents Page of EMS / Management System Structure

MURFITTS INDUSTRIES LTD

LAKENHEATH TYRE RECYCLING FACILITY

MANAGEMENT PLAN

OPERATOR:

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APPENDICES

APPENDIX A K18.2~09~003 Permitted Waste Types

APPENDIX B **Other Important Documents**

Environmental Permit	K18.3~07 Permit EAWML75221 (CP3396NQ) 280607
Evidence of Technical Competence	MROC1 Certificate Magda Jackson - 601 8528 4 – 210618
Fire Risk Assessment Lakenheath Site	
Fire and Emergency Evacuation Procedure	

APPENDIX C K18.3~09~002 Accident Risk Assessment and Management Plan FINAL 02.11.18

APPENDIX D **Site Drawings**

WIS2651-5 Location Plan 21.03.07
WIS2651-2 Application Boundary 21.03.07
K18.3~20~002 Site Layout Plan Rev E 2023 04 26
K18.3~20~003 Site Drainage Plan 31.10.18
K18.3~20~004 Sensitive Receptors Plan 02.11.18

REVISION HISTORY

DATE	REF:	STATUS	REVISION SUMMARY
17 th April 2023	K18.3~09~001 v7	CURRENT	Amendments to reflect site layout alterations.

DATE	REF:	STATUS	REVISION SUMMARY
22 nd April 2021	K18.3~09~001 v6	SUPERSEDED	Update to remove documents from appendices
31 st October 2018	K18.3~09~001v5	SUPERSEDED	Update in response to EA CAR (75221/0310760), reflecting changes on site (new buildings for granule production, new concreted and storage areas).
27 th February 2014	K18.3~09~001v4	SUPERSEDED	Minor changes identified in EA CAR (30/112012). S1.2.2, s6.1, other amendments made according to changes in operation.
1 st July 2011	K18.3~09~001v3	SUPERSEDED	Redrafted following comments for Tim Wojcik (EA – 16/12/10), changes to operations on site, and changes to draft PPG29
13 th October 2010	K18.3~09~001v2	SUPERSEDED	Comprehensive update following significant changes to site operations
21 st March 2007	K18.3~09~001A	SUPERSEDED	Changes to Risk Assessment, storage quantities and storage areas. Submitted with waste management licence application.
29 th November 2006	K18.3~09~001	SUPERSEDED	1 st Draft of Working Plan for internal review.

Revisions will be indicated in the document by a vertical line inserted in the right hand margin adjacent the altered text, as indicated here.

1 SITE LOCATION, OVERALL PRINCIPLES and SCOPE

This document is the Management Plan for the Murfitts (the Operator) Lakenheath Tyre Recycling Facility, operated in accordance with Environmental Permit (EAWML75221 (CP3396NQ)) which permits the treatment of non-hazardous waste at the facility located in Station Road, Lakenheath, Suffolk, IP27 9AD, grid reference TL 7248 8638.

The Lakenheath tyre recycling facility site is located on land to the west of the B1112, just north of Lakenheath railway station, at a former vegetable processing factory. It is approximately 1.5km south of Hockwold-cum-Wilton and 2.75km to the north of Lakenheath, as indicated on the Location Plan (see Drawing Number WIS2651-5 within Appendix D).

Approximately 1.9km south of the site is the junction of the B1112 with the Wangford Fen Road. This joins the A1065 south of Brandon, giving access to the east and south via the A11, the west via the A10 and the north via the A1065. The hinterland of the site is light industrial, mainline railway and agricultural in nature.

This facility provides state of the art processing of tyres, with equipment purchased from a variety of specialist suppliers from around the world. Reconfiguration of the production lines has helped to minimise the impact of the process on the environment and surrounding area; for example those elements with the greatest potential for noise impact are provided with acoustic enclosures; areas where lighter, loose material is found are now transported through the process using enclosed, screw conveyors with dust emissions controlled by an active extraction system.

Processing involves reducing the size of the rubber waste and tyres to produce various sizes of shredded and granulated material. These various grades are then sold as product for use as drainage media, as well as road, equestrian and sports surfacing.

These products are tested according to quality protocol *PAS 107 "End of waste criteria for the production and use of tyre-derived rubber materials"* and cease to be waste and, even though they may be stored within the Permit boundary, don't require compliance with the Environmental Permit conditions. These are the only materials that can be stored in the concreted area outside the Permit boundary.

The facility is designed to take advantage of the rapidly developing tyre recycling markets. The Landfill Directive banned the landfilling of whole tyres in July 2003 and shredded tyres from July 2006, which has meant that large volume processing facilities, such as Lakenheath, are required to deal with the increasing numbers of tyres that need to be reprocessed.

1.1 Scope of the Management Plan

The Management Plan is a comprehensive document to detail the principles, infrastructure, operational activities, methods and environmental controls for the site. It forms part of the Company's Management System and contains guidelines and procedures for the site management and operatives to ensure that the site is operated in accordance with the requirements of the Environmental Permit (EAWML75221(CP3396NQ)), particularly Condition 1.1.1.

1.1.1 The activities shall be managed and operated:

(a) in accordance with a management system, which identifies and minimises risks of pollution, including those arising from operations, maintenance, accidents, incidents, non-conformances and those drawn to the attention of the operator as a result of complaints; and

(b) by sufficient persons who are competent in respect of the responsibilities to be undertaken by them in connection with the operation of the activities.

The Management Plan incorporates detail required for the issue and regulation of an Environmental Permit issued by the Environment Agency to prevent harm to human health, pollution of the environment and avoid serious detriment to local amenity. It is designed to offer flexibility of operation and ensure changes considered not to be of significant effect are more easily and speedily incorporated.

The Management Plan is supplemented by other business management and operational procedures which form part of a management system that is operated in accordance with the ISO9001 and ISO14001 standards for quality and environment.

The site operational procedures will be reviewed, at least, annually; where identified through complaint, non-conformance, internal or external audits improvements will be implemented at the direction of senior management.

Murfitts Industries Limited will ensure that copies of all relevant supporting documents are accessible to all people given responsibility for the management or control of the site.

1.2 Permitted Activities

The site operates as a waste facility in accordance with the Environmental Permitting (England and Wales) Regulations 2016 (as amended). The processes at the site are listed in Table 1 (below), with reference to Annex IIB of The Waste Framework Directive; Condition 2.1.1, and Schedule 2, Table S2.1 of the Environmental Permit.

Table 1. Permitted Activities

CODE	DESCRIPTION OF ACTIVITIES
R3	Recycling or reclamation of organic substances which are not used as solvents
R4	Recycling or reclamation of metals and metal compounds
R5	Recycling or reclamation of other inorganic materials
R13	Storage of wastes pending any of the operations numbered R1, R3 and D10

The method of operations is given in broader detail in Sections 5 to 7 below. This management plan details all operational procedures whether covered under the jurisdiction of the Environment Agency or not.

1.3 Environmental Management System

This Management Plan forms part of an internal Management System which is based on formal Company policies for quality, health and safety, and the environment, and contains detail specific to the site and is operated in accordance with the ISO9001 and ISO14001 standards.

The Environmental Policy provides commitments to:

- Prevent pollution and continually improve;
- Comply with applicable legal and other requirements relating to environmental aspects;
- Document, implement and maintain an environmental management system and;
- Communicate to all persons working on or on behalf of organisation.

1.4 Waste Acceptance

The site will primarily accept tyres for reprocessing on site but there may be occasions (e.g. when plant is down or being maintained) when tyres will be diverted for processing or storage at other sites; loads may also be sorted for processing off site.

For the purposes of waste classification tyres are defined in the European Waste Catalogue as:

16 01 03 End of life tyres

The facility may also receive other rubber-based wastes which pass through the same process machinery, producing a similar end product. Currently these are likely to be rejects from primary production processes such as windscreen wipers, shock absorbers, and other technical rubber wastes.

16 01 22 Components not otherwise specified – wiper blades, shock absorbers, window seals and other technical rubber

16 03 06 Organic wastes other than those mentioned in 16 03 05 – tyres, wiper blades, shock absorbers, window seals and other technical rubber

Appropriate List of Waste codes must be present on all Duty of Care Waste Transfer Notes.

Details of specific waste streams, and appropriate List of Waste/European Waste Catalogue (LoW/EWC) codes are held in Appendix A to this Management Plan.

ONLY WASTES SPECIFIED IN APPENDIX A MAY BE ACCEPTED AT THE SITE.

1.5 Annual Waste Quantities

The site will receive a maximum throughput of 74,999 tonnes per year of wastes covered by the Environmental Permit.

1.6 Storage Capacity

The maximum storage quantities have been calculated so as to provide the plant with a constant feedstock thus avoiding downtime due to lack of material to process, whilst ensuring that material stockpiles are limited, and 6m away from both each other and potential sources of ignition.

A Fire Risk Assessment (FRA) was undertaken in accordance with Regulatory Reform (Fire Safety) Order 2005.

Operational experience, and advice from the Fire and Rescue Service, Health & Safety Executive and Insurance Providers, determined the appropriate distances between both individual stockpiles of materials and between different types of materials, given the dimensions of receipt, processing and contingency areas.

The EA's fire prevention guidance¹ has also been considered and as such waste piles will not exceed the maximum stated sizes nor encroach on the advised separation distances. For details of pile sizes and locations please see the Site Layout Plan (K18.3~20~002).

The following assumptions used to calculate these storage quantities are for guidance only; the actual tonnage remains the measured limit;

20 Truck Tyres = 1000kg = 5m³

125 Car Tyres = 1000kg = 6m³

Shred = 1000kg = 2m³

Table 2 below represents the maximum amount of each type of waste likely to be found on site at any one time; given the limitations set by the constructed storage areas it is exceedingly unlikely that all types of material will be stored at these maximum levels at the same time.

In addition to the quantities of waste materials stored on site, an area to the north of the site has been designated for the storage and dispatch of quality protocol *PAS 107* shredded and granulated material.

The *PAS107* material is no longer considered to be waste and, even though they may be stored within the Permit boundary, does not require compliance with the Environmental Permit conditions. Regardless good practice is applied to material storage to ensure risk of adverse environmental impact is minimised.

These are the only materials that can be stored in the concreted area outside the Permit boundary.

¹ <https://www.gov.uk/government/publications/fire-prevention-plans-environmental-permits/fire-prevention-plans-environmental-permits#manage-waste-piles>

Table. 2– Storage Quantities

WASTE TYPES	MAXIMUM STORAGE QUANTITY (TONNES)
Whole tyres	2000
Shred	1200
Steel	500
Fibre	100
MAXIMUM STORAGE AT ANY ONE TIME	3800

NB: The Permit allows the storage, at any one time, of 5511 tonnes comprising of up to 500 tonnes of metal and 5011 tonnes of non-hazardous waste.

See Section 5 details of contingency feedstock storage and processing locations.

2 SITE ENGINEERING AND DESIGN

2.1 Surfaces

The areas of the site described below are shown on K18.3~20~002 Site Layout Plan.

During late 2009 and 2010 extensive development of the site was undertaken; an additional 7100m² of new concrete was placed to the north, east and west of the site, to provide an overall area of approximately 15,000m² of impermeable surface. Further development of the concrete surface to the north and north east of the site brought the overall area of impermeable surface to approximately 32,000m².

All waste management activities with a significant pollution potential are undertaken on this impermeable surface to reduce the likelihood of uncontrolled discharge of contaminated runoff to ground, surface water or groundwater.

The impermeable surface is constructed from heavy-duty use concrete (PAV2) 200mm thick, with fibres, 410kg/m³ Ordinary Portland Cement (OPC); this is reinforced with wire mesh and underlain by a polythene Damp Proof Membrane (DPM) and

150mm Department of Transport (DOT) Type 1 sub-base. Typically, the pavement is laid out in pads approximately 6m by 9m jointed with fire resistant sealant.

The areas to the north, east and southeast of the processing building holding waste tyres and final product are surrounded by a 250mm reinforced up stand and constructed with a fall to sumps on the eastern boundary.

Routine inspections of the integrity of the site surface will be undertaken in accordance with Table 5 Maintenance and Inspection found in Section 6.11 below.

Where corrective action is identified as being required this will be recorded; responsibility will be allocated, and completion required within a specified timeframe.

2.2 Drainage

The drainage system described below can be seen on K18.3~20~003 Site Drainage Plan.

Existing drainage runs and roof run-off have been connected into the drainage system which also collects the surface run-off from the new paved areas and the roof water from the buildings.

The water within the system passes, via one of two drainage zones, through a series of catch pit manholes and sumps before passing through a class 1 interceptor.

The catch pits and sumps are designed to remove the majority of silt and heavy particles and the interceptors will retain any oils.

From the interceptors, the water is pumped, by float switch from the pump chamber, to the western lagoon (Lagoon 1) which is 150m north of the main manufacturing building (number 12 in Site Layout Plan). This lagoon is, in turn, connected to a lagoon (Lagoon 2) to its east, through a high-level pipe overflow.

The lagoons have an approximate capacity of 1600m³, and can be used as a source of firefighting water.

The two lagoons have been designed with a capacity that significantly exceeds the wash water capacity of the current site.

Both lagoons are lined with butyl rubber sheet lining and underlined by dense silty clay, which provide an impermeable system.

The drainage system is equipped with two stop cocks which allow for two sections of the paved area to be separately isolated and flooded with water for firefighting purposes, if required. This also allows for either side to be isolated if a spillage occurs. These areas provide approximately 3000m³ of holding capacity (see catchment area in K18.3~20~003 Site Drainage Plan).

2.3 Other Design Features

The reprocessing building is designed to incorporate other features to minimise the potential for environmental impact. These features include:

- Process flow has been redesigned to make process more efficient and to provide better control of noise, dust and fire risk.
- Automatic spark detection activates fire extinguishing and explosion protection systems
- Dust suppression on liberators provided by a wet dust arrestor.
- Acoustic enclosures provided around significant noise sources.
- A sealed dust extraction system removes and filters fine particles, and deposits them in bags which are then sealed before removal off site.
- Auger conveyors have been installed where part processed material has a greater risk of liberating dust.
- The roof and walls of the process building are panel clad with up to 80mm sandwich of expanded foam to reduce noise and vibration.
- Paint storage building equipped (No. 15 in K18.3~20~002 Site Layout Plan) with smoke detectors and fire alarm, activation of which will result in the Emergency Services being alerted

Additionally, the configuration of the site allows significantly lower stocks of whole tyres and shred than normally associated with similar scale tyre recycling facilities; this both

reduces the risk of an incident occurring and, in the event of such, the scale of environmental impact.

2.4 Maintenance and inspection

Daily inspections of the concrete pavement, buildings, and drainage will be undertaken by the Technically Competent Manager (TCM) or a person appointed by the TCM, in accordance with Section 6.11 Summary of Maintenance and Inspection Required. All significant defects will be reported, recorded and allocated to a responsible person for corrective action within an agreed timeframe.

3 SITE INFRASTRUCTURE

The layout of the site is shown on plan K18.3~20~002 Site Layout Plan.

3.1 Site Security

The south of the site is bordered by a railway and the north and east limits of the wider site are marked by the Little Ouse River and its tributaries.

The western boundary with the public highway, Station Road, is secured with a combination of metal palisade fence, and wire mesh.

Access to the site is controlled via two gates; these are secured by an automatic security barrier which remains closed, other than to allow authorised access to the site. The gates are covered by CCTV which enables active control over who enters the site.

Reprocessing can be undertaken 24 hours a day, 7 days a week, in which event the site will be constantly manned.

Outside operational hours security is provided to ensure the site is constantly manned.

The process buildings and site office are alarmed, activation of which will result in the Emergency Services being alerted.

3.2 Site Access

The site is accessed via the B1112, which links directly to the A134 to the North and the A1065 to the south. Approximately 1.5km south of the site is the junction with Wangford Fen Road; this joins the A1065 south of Brandon, giving access to the east and west via the A11. All the roads leading to the site are surfaced in tarmac.

The site access is via the gates marked on K18.3~20~002 Site Layout Plan. The primary point of access for the site will be Gate 1 north of the site office.

3.3 Site Information

An information board is displayed on the main site gate which details site name, address and telephone number, emergency contact numbers, address and office telephone numbers, hours of opening, permit number and the Environment Agency's general enquiries and emergency contact telephone numbers.

3.4 Site Office and Welfare

The site office is located adjacent to the site entrance. Welfare facilities for the administrative staff are provided within this building; and welfare for operational staff is provided to the north of the main site entrance (K18.3~20~002 Site Layout Plan).

The weighbridge office is located next to the main site entrance (Gate 1) to provide good visibility for both incoming and outgoing vehicles, and is equipped to allow efficient control and recording of waste deliveries to the site.

The site office is provided with electricity, telephone/fax, fire extinguishers and first aid equipment.

A copy of the Certificate of Lawful Development, Environmental Permit and this Management Plan will be kept within the office.

A visitor's book and accident book will be located in the Site Office.

3.5 Fuel and oil storage

Where applicable, any fuel and machinery oils for use in site plant and equipment are stored appropriately and in accordance with the Control of Pollution (Oil Storage) (England) Regulations 2001.

3.6 Site Services

The site is provided with mains water, electricity and telecoms services.

3.7 Weighbridge

A weighbridge is located at the front of the site to the west of the process building (see K18.3~20~002 Site Layout Plan).

The weighbridge will be used for the weighing in and the weighing out of all vehicles, and weighs to an accuracy of +/- 20kg.

The weighbridge will be calibrated and will be inspected on an annual basis for compliance with the *Weights and Measures Act 1985*. The weighbridge will be maintained in accordance with Section 8.11 Summary of Maintenance and Inspection Required.

4 STAFFING AND EQUIPMENT

Broad operational instruction for site management and operatives is given in this document. Where required specific written instruction on operation of specific items

of plant and machinery are contained within Work Instructions stored in the site office. Any personnel undertaking work on the plant and machinery will be given specific instruction and training as appropriate.

Management Procedures are in place to ensure training, communication, and management supervision of works is properly conducted. These procedures form part of an internal Management System. Updates in training will be as necessary or when the Permit or this document brings a change to the duties or expectations of personnel.

4.1 Site Staffing

4.1.1 Management

The site is operated under Technically Competent Management by a person qualified through schemes approved under the Environmental Permitting (England and Wales) Regulations 2016.

Details of the Technically Competent Manager(s) (TCM) will be provided to the Environment Agency and held in Appendix B of the site copy of this document. At times where the specified TCM is unavailable, an alternative TCM will be brought in as management cover; the Environment Agency will be made aware of these changes.

Responsibilities include day to day operations and activities at the site, ensuring compliance with Permit and planning conditions, ensuring compliance with Health and Safety Policy, and liaison with the Environment Agency and other regulatory bodies.

4.1.2 Operations Staff

The duties of operational personnel will be to control incoming and outgoing vehicles, inspect materials to ensure compliance with Permit conditions and Waste Transfer Notes, control vehicle movements, use and be responsible for safe operation and

maintenance of equipment; maintain the site in a tidy condition, and report any problems to management.

Additional persons may be brought to the site as necessary for maintaining tidiness, engineering, plant maintenance, personnel training, compliance audits, and any other duties necessary to ensure health and safety and environmental protection.

4.1.3 Competence and Awareness Training

All staff will be given relevant training to allow them to undertake their job in a safe and professional manner. They will also be given instruction on the relevant parts of the planning permission, conditions of the Permit, and Management Plan to effectively and efficiently carry out their job function. Outside agencies may also be used, as appropriate, for training. Training will be documented and records kept.

4.1.4 Operational Hours

Waste receipt

The normal opening hours for the facility (i.e. when waste may be received at the site) will be:

Monday to Friday	07:00 to 19:00 hrs
Saturday	07:00 to 14:00
Sunday	None
Bank Holidays	None
Other Public Holidays	None

The Environment Agency will be informed of any proposal to receive waste where there are likely to be significant or extended changes outside these normal hours.

Waste Processing

The processing of tyres may be carried out during the following hours:

Monday to Friday	00:00 to 23:59
Saturday	00:00 to 23:59
Sunday	00:00 to 23:59
Bank Holidays	00:00 to 23:59
Other Public Holidays	00:00 to 23:59

Any proposed changes to the operational hours will be agreed in writing with Forest Heath Planning Authority and the Environment Agency.

4.2 Plant and Equipment

A calibrated weighbridge will be provided at the site entrance with computerised weighing facilities to ensure an accurate record of all incoming wastes is kept.

The site is equipped with specialised waste handling and processing machinery, both mobile and static. The machinery has been specified to ensure maximum recyclable material is extracted from the tyres; maximum payloads for tyre delivery vehicles; ease of handling; reliability; safety of operatives and site users; and for the capability and fitness for purpose of handling large quantities of tyres.

The equipment to be used at the site will be similar to the following:

- Fork lift trucks
- Shredder
- Granulation mills
- Grinding mills
- Bagging unit
- Dust extraction units
- Steel grading machine
- Balers

All mobile plant will have safety equipment, including warning beepers and lights for reversing. The warning beepers will have their sound level related to ambient background noise to minimise any impact.

If necessary, as a result of breakdown, site vehicles can be replaced by lease hire vehicles within 8 hours. Routine maintenance is carried out in accordance with the manufacturer's recommended service intervals.

Preventative maintenance of the process machinery, including greasing and blade changes will be carried out according to manufacturer's instruction to ensure that the processes run efficiently. Daily checks will include visual checks of elements of the process e.g. conveyors and the effective operation of the dust extraction system.

Should the process machinery breakdown then the specific production line will be stopped, or reconfigured, until the machine is repaired. Deliveries of tyres will be stopped once maximum contingency feedstock storage limits are reached.

The dust control system is zoned to specific parts of the production process where a unit breaks down that specific zone will stop production until it is repaired.

Instructions are in place for each type of processing machine. Operatives are trained to use the plant and training records are maintained.

5 SITE OPERATIONS

5.1 Waste Receipt and Storage

5.1.1 Health and Safety

All vehicles entering the site will stop at the weighbridge and report to the yard manager. First time visitors to the site will be required to read the displayed notice giving instructions on health and safety and site procedures.

5.1.2 Duty of Care

The driver of the incoming vehicles will be required to provide a document detailing the source location and description of the waste they are carrying for Duty of Care purposes. A copy of this description will be kept at the site office. Annual duty of care notes are provided by some customers for inputs where the producer, description of waste, and approximate quantity does not vary. A copy of these notes will be held at the site office.

5.1.3 Carrier registration

Companies used to transport waste to and/or from the site will be checked to ensure that they are Registered Waste Carriers. Where there is uncertainty regarding registration, a carrier will be asked to provide a validated proof of registration or confirmation of exempt status.

5.1.4 Waste description

All loads will be described appropriately and will only be acceptable where in compliance with acceptable waste types specified in the Environmental Permit (refer to Appendices A & B).

5.1.5 Waste receipt

The site routinely accepts pre-booked deliveries of tyres for processing from contracted suppliers; other one-off loads may also be received from local contractors.

Initial contracts are set up and details exchanged at the preliminary stage include details of types, quantities and frequency of tyre deliveries. Confirmation of the tyre suppliers Waste Carriers Licence is obtained and once the contract is agreed an annual waste transfer note is set up.

All deliveries are received on a pre-booking system so that a steady and manageable stock can be maintained.

On receipt of a pre-booked load of tyres a weighbridge ticket/waste transfer note is created.

5.1.6 Non-compliant waste

Where a delivery of waste has been identified as not acceptable under the conditions of the Permit (i.e. not listed in Appendix A) prior to unloading or vehicle dispatch, deposit at the site should be refused with the load returned to place of production or directed to an alternative permitted site. The producer will be informed of the problem and future expectations. A written record of rejection should be made and the TCM informed.

Where a delivery is found to contain non-compliant waste after the delivery vehicle has deposited the load and left the site, this material will be held in a holding area. The material will be stored on an impermeable pavement at a location that can be clearly separated from acceptable wastes to prevent it from being inadvertently processed. The supplier will then be contacted to arrange appropriate disposal.

If the rejected material contains or appears to contain hazardous waste the Environment Agency will be informed of the event to see whether any further action is necessary.

If possible, and if it is safe to do so, the unpermitted waste will be loaded back onto the vehicle that discharged it. If not possible or safe to do so, the manager will consult the Environment Agency on the course of action to be taken.

The supplier will be informed and advised as to future conduct.

5.1.7 Spillages

All operational areas of the site are surfaced and drain to a sealed drainage system. Where appropriate (e.g. oil spills) spillages will be dealt with by use of absorbent materials. A supply of absorbent material is kept dry and covered at designated locations around the site. Material will be spread over the spillage and removed only when completely soaked up. Any residual waste created whilst dealing with a spillage will be loaded to a sealed container pending off-site disposal to a suitably permitted site.

In the event of any major spillage or fuel leakage, which cannot easily be absorbed using granules, the emergency spillage procedures will be followed.

- The area of the spillage will be, as far as possible, surrounded by absorbent materials such as sand, soils or granules to prevent the spillage from spreading.
- Where possible, absorbent material will be used to prevent the spillage entering those drain(s) likely to be impacted.
- The area will be cordoned off, to prevent vehicles or visitors driving or walking through, using cones and ropes or empty containers.
- The cause of the spillage or leak will be dealt with to prevent further leakage, if necessary, by calling in specialist personnel.
- Once the source has been repaired or isolated, the remaining liquid will be soaked up using granules or other absorbent material. The resulting material will be stored in a suitable container pending its disposal off-site.
- Where the incident has, is or may cause significant pollution the Environment Agency will be informed without delay.
- Details of all actions taken will be recorded. Following any incident that has, or had the potential to cause significant pollution, senior management will review the incident, determine any future preventative actions that could be taken to avoid such an incident, incorporate these into operational practice and ensure all relevant staff are aware and appropriately trained.

5.2 Storage and Handling

5.2.1 Storage

Where deliveries are found to be acceptable material will be off loaded, prior to processing or onward transfer, in the appropriate bays or areas.

Under normal operating conditions these areas are constantly being cleared and restocked on a daily basis. This material is considered process material and is in transit through the recycling process. Sufficient stocks of process material, from various points of the recycling process must be maintained to ensure continuity of production. These materials will be located in those areas specified in Table 3 below.

Long term storage of tyres is not routinely required on site and would only be necessary in abnormal situations, so as to ensure sufficient feedstock to maintain production. In such an event storage of contingency feedstock will be located in those areas specified in Table 3 below.

Locations of the areas for whole tyres, processed & part processed material, contingency feedstock and product can be found on K18.3~20~002 Site Layout Plan.

In summary these are;

Table 3. Process material storage locations

MATERIAL	LOCATION	REF.
Whole Tyres (Car and/or truck)	Tyre receipt & processing area	Labelled bay & adjacent building
	Whole tyre feedstock area	IDs 1, 5 & 6
Shred (requiring further processing)	Bays to north of process building	IDs 2, 3, & 4
Steel (baled and palletised)	Bays to north of process building	Bays 7 & 8
Finished Product (PAS 107 non-waste)	Storage areas in yard and north-east corner	See marked areas

Table 4. – Contingency feedstock storage locations and quarantine area

MATERIAL	LOCATION	REFERENCE
Whole Tyres (Car and/or truck)	Contingency feedstock area	ID 1
	Quarantine area	ID 10

The bays holding part processed material (shred - IDs 2, 3 and 4), and the whole tyre feedstock area (IDs 1, 5 and 6) are constructed from precast concrete frame walling system ('Alfabloc'). Maximum heights of material within these areas will be determined by the natural angle of repose for the materials held.

A Fire Risk Assessment (FRA) was undertaken in accordance with Regulatory Reform (Fire Safety) Order 2005.

Operational experience, and advice from the Fire and Rescue Service, Health & Safety Executive and Insurance Providers, determined the appropriate distances between both individual stockpiles of materials and between different types of materials, given the dimensions of receipt, processing and contingency areas (see K18.3~20~002 Site Layout Plan).

The EA's fire prevention guidance² has also been considered and as such waste piles will not exceed the maximum stated sizes nor encroach on the advised separation distances. For details of pile sizes and locations please see the Site Layout Plan (K18.3~20~002).

As described in Section 2 all external processing and storage areas are underlain by concrete; these areas are bounded by a 250mm reinforced concrete up stand and are constructed with a fall to sumps on the northern and eastern boundaries. Run off within the drainage system then passes through Class 1 separators, each of which can be isolated by the manual operation of a shut off valve.

During normal operation all external areas drain to a pumping manhole to the north-east of the site where, by way of a float switch, water is pumped into a lagoon (Lagoon 1) to the north of the operational area.

On arriving in the eastern yard vehicles are directed to the tyre receipt & processing area (see indicated bay and adjacent building K18.3~20~002); tyres will then be offloaded, inspected and either designated suitable for processing elsewhere or as

² <https://www.gov.uk/government/publications/fire-prevention-plans-environmental-permits/fire-prevention-plans-environmental-permits#manage-waste-piles>

feedstock for processing on site. Those tyres suitable for off-site processing will remain in the receipt and processing area until they can be reloaded onto vehicles and despatch from site. The remaining tyres will either be transferred directly for shredding, or dependant on volume of material flows in to site or capacity of shredding process, deliveries may be instructed to off load into the main waste storage area (ID 1, Site Layout Plan K18.3~20~002).

In order to ensure that the process machinery is utilised to its maximum, it is essential that the site carries sufficient feedstock to cover those periods when inputs fall below the process rates. The contingency feedstock storage area (ID 1) will be used in a flexible manner to in order to allow swift response to the market for different tyre derived rubber products.

Though not covered by the conditions of the environmental permit finished product will be stored in designated areas (see Site Layout Plan K18.3~20~002); in addition to clearly separating waste and product storage, this area will also provide some degree of visual screening and noise attenuation.

5.2.2 Handling

Whole tyres will be delivered to the tyre receipt and processing area (see K18.3~20~002 Site Layout Plan), they will be unloaded and inspected. Where inspection identifies that tyres are suitable for processing off site these will be collected in a section of the receipt and processing area awaiting removal off site. Any remaining tyres destined for shredding will either remain here and delivered, when required, to the shredding area or directed to the whole tyre feedstock area (ID 1, K18.3~20~002).

Under normal operations whole tyres will be moved from the tyre receipt area to the processing area by way of a manual roller conveyor.

Once the tyres have passed through the shredder, shredded material will be deposited directly into dedicated shred bays (IDs 2, 3, & 4). These provide sufficient stock to allow for continuous operation of the production lines and allow for the variable flows of whole tyre inputs.

A loading shovel will move material from the shredded tyre bays and load one of the hoppers at the start of each production line.

5.3 Recovery & Transfer

During the period since October 2009 the site has undergone wholesale changes both in terms of infrastructure and process configuration. Prior to this the site operated to support the Company's main operations at Littleport (Wisbech Road, Wisbech Road, 195 Wisbech Road, Littleport, Cambridgeshire, CB6 1RA, Environmental Permit now revoked).

The redevelopment of the Lakenheath site has provided the Company with an opportunity to design and build a processing facility that produces the most efficient material flows; building on the lessons learnt from the development of the Littleport facility and the comprehensive knowledge of global tyre processing technology gained by key staff at the Company.

Summarised below are the key elements of the process at the site; for reasons of commercial confidentiality detail of specific plant configuration has been omitted, though this is may be scrutinised by the Environment Agency at any time during their random, and unannounced visits to the site to assess compliance with the permit.

5.3.1 Shredding

Tyres will be taken from the designated tyre receipt and process area and fed into a shredder located in the eastern yard; this reduces the whole tyres to rubber chip or shred, the dimensions of which are determined by the product specification required e.g. <50mm chips (CC) for equestrian surfacing manufactured to PAS107. The close knife-to-knife tolerances in the shredder mean that the tyre is cut cleanly and can be stored and conveyed easily with little or no exposed wire.

The process machinery has been designed to allow the production of a variety of sizes of shredded, granulated and crumbed rubber materials dependent upon market requirements.

Material from the shredder is then directed by conveyor to either a 'work in progress' bay (where further shredding is required) or into a bay for shred awaiting discharge into one of the processing lines.

5.3.2 Granulating (1st Stage)

Material from the shredding stage is loaded by shovel into the hopper at the start of the relevant process line. The first stage of size reduction reduces the material down in size whilst steel is separated from the rubber.

The rubber material continues through the process machinery via either belt or auger conveyors for further size reduction dependant of grade of the end product.

Steel liberated from this part of the process is collected and either passes to the baler unit or is taken directly to the steel storage area to the north of the process building.

5.3.3 Granulating (2nd & 3rd Stage)

Subject to the material specification required by the end user the rubber material then passes through further size reduction. During these elements of the process fibre is removed and collected for off-site disposal or recovery.

The specification system for material production will be in accordance with PAS 107 incorporating; the category of the material e.g. (G) granulate; the source of the material e.g. (TW) truck tyres; the processing technology e.g. (A) ambient; and the particle size e.g. 1 to 3mm.

5.3.4 Steel recovery

Steel liberated from the shredding and granulating process is stored in designated bays outside the process building, in either loose or bailed form, prior to despatch as a raw material for smelting at steel mills.

5.3.5 Fibre extraction and dust control

Each individual process has its own dedicated dust control unit. These units are sealed to prevent uncontrolled discharge of dust. Dust is collected and bagged where it is sent for disposal or recovery. The units are ATEX rated³ and provide a level of filtration that could, if required, allow the air to be recirculated into the process building.

5.3.6 Waste transfer

Whilst normal operation of the site is primarily the processing of tyres as summarised above, there may be occasions where market or contractual demands require the receipt and transfer of tyre derived materials with either no or partial treatment.

Where this occurs acceptance procedures will be applied, as described above, to ensure the wastes are compliant with the permit and that sufficient information is recorded to provide for both Duty of Care requirements and the need to supply accurate waste input/throughput returns to the EA.

To ensure this the tare weight of outgoing vehicles will be recorded on the computer and a ticket printed with all relevant detail recorded. This will be signed by both a representative of the company and the waste carrier. A copy of the waste transfer note will be kept in the site office for 2 years.

³ ATEX is the name commonly given to the two European Directives for controlling explosive atmospheres: 1) Directive 99/92/EC (also known as 'ATEX 137' or the 'ATEX Workplace Directive') on minimum requirements for improving the health and safety protection of workers potentially at risk from explosive atmospheres.

5.3.7 Other transfer & recovery operations

Murfitts Industries Ltd needs to be in a position to respond swiftly to the rapidly developing recycling markets. Where amendments to the current transfer and recovery operations are proposed, and these fall within the constraints of the Permit, the Environment Agency will be informed of any developments so that appropriate amendments to the Management Plan can be considered and made in an expeditious manner.

6 ENVIRONMENTAL MANAGEMENT

6.1 Fire Prevention

All fire prevention measures implemented on site have been drafted with the appropriate Environment Agency fire prevention guidance in mind.

6.1.1 Fire Risk Assessment

A Fire Risk Assessment (FRA) was undertaken in accordance with Regulatory Reform (Fire Safety) Order 2005.

Following guidance issued by the Department for Communities and Local Government and the Chief Fire Officers Association this incorporates the following;

- Identify fire hazards;
- Identify people at risk;
- Evaluate, remove or reduce, and protect from risk;
- Record, plan, and train; and
- Review.

The Fire Risk Assessment is reviewed on an annual basis to establish any significant changes and points of improvement.

6.1.2 Site rules

Site rules will be provided to all visitors to the site so that they are aware of the risks and consequences of fire, in particular how their actions or activities may impact this risk.

A no smoking policy will operate in all areas of the site, other than the designated smoking areas which shall be away from areas of combustible material. All incoming wastes will be inspected on deposit to check for burning, smouldering or smoking wastes.

Any fire on site will be regarded as an emergency and action will be taken to attempt to extinguish it immediately.

6.1.3 Security

The site is manned during operational hours. This will reduce the likelihood of unauthorised access to the site and helps to monitor the external storage of material.

6.1.4 Fire breaks

Prior to processing, tyres will be stored in designated locations (see Section 5 above) whose dimensions and distance from potential ignition sources and other combustible wastes will be determined by a Fire Risk Assessment undertaken in accordance with the Regulatory Reform (Fire Safety) Order 2005. Separation distances are implemented where necessary across waste storage areas on site, in accordance with the EA's fire prevention guidance. Some wastes such as tyre shred is stored within fire-resistant concrete bays which negate the need for separation distances; approximate dimensions of these areas are provided on the Site Layout Plan (K18.3~20~002). Wastes stored in piles or bales do not exceed the maximum limits stated on the Site Layout Plan which have been designed in accordance with the EA's fire prevention guidance.

6.1.5 Awareness & Training

Training on fire prevention procedures will be given to all operatives. A record of this training will be kept.

6.1.6 Fire drills

A fire and emergency evacuation drill will be carried out at least 6-monthly under the direction of senior management. Fire alarm tests will be carried out on a weekly basis.

This will ensure site staff are aware of evacuation procedures, and of locations and methods of use of fire equipment. Records of these events will be kept.

Any improvements to procedures, equipment or training identified during drills or alarm tests will be recorded and corrective actions implemented by senior management.

6.2 Fire Control

6.2.1 Fire suppression equipment

There are a number of sources of water on, or adjacent to, site to use for fire suppression. Within the process building are hoses linked to mains water, as well as the dust suppression system. Water from the adjacent lagoons may also be used to control any fire on site. In accordance with the EA fire prevention guidance a fire hydrant is also accessible within 100 m of the site boundary: approx. 20 m away on the B1112.

The process machinery is fitted with an automatic spark detection system which activates fire extinguishing and explosion protection systems.

The fire equipment will be visually checked on a weekly basis to ensure readiness for use. An annual certification check will be carried out and recorded by an external professional on all fire equipment to ensure full compliance with fire requirements.

Spark detection systems are built into the dust extraction ducting. These are alarmed both visually and audibly and incorporates auto shutdown within the ducts should alarms be triggered.

6.2.2 Dealing with Fires

Fire extinguishers will be located in the site office, welfare facility and at strategic points around the process building and wider site. In the event of a small fire, and where safe to do so these will be used, in conjunction with the site machinery, to isolate smouldering, or burning wastes from other areas at risk of combustion.

In the event that a fire cannot be controlled using hand held extinguishers, the Fire Service will be called, and where safe to do so, the fire will be contained and a firebreak made between the fire and other areas at risk of combustion. Where viable and dependent on the location of the fire, the indicated quarantine area (see Site Layout Plan, K18.3~20~002) will be utilised to remove burning waste or non-burning waste to prevent further combustion.

The external concrete areas drain to a sealed drainage system that, in the event of a fire, can be allowed to 'back up' and provide a shallow area for quenching burning material or to provide a source of firefighting water. The area around the sump to the east of the site has the capacity to hold in excess of 3,000,000 litres of water (see catchment area in K18.3~20~003 Site Drainage Plan). This containment capacity far exceeds the stated requirements within the EA's fire prevention guidance.

6.2.3 Residues

Any residues from a fire will be first checked to see if completely extinguished. They will then be loaded on bulk collection vehicles for onward disposal at a suitably licensed landfill site in accordance with the EA's fire prevention guidance.

6.2.4 Fire Water

The site's impermeable pavement and sealed drainage system will provide significant storage capacity in which to contain fire water. In addition to this holding capacity, the lagoons to the north of the site can provide firefighting water. Both the water supply and containment capacity significantly exceeds the minimum requirements determined by the size of the largest waste pile (450 m³).

6.2.5 Maintenance of surfaces and drainage system

After any major fire, surface cleaning, interceptor clearance and residual removal will be undertaken, as will checks to the integrity of the hardstanding and drainage system. Records kept.

6.2.6 Informing regulatory bodies

Where the shut off valve is required to be activated or there is risk of potentially polluting material entering controlled waters the Environment Agency will be informed as soon as is reasonably practical.

6.2.7 Incident Reporting and Investigation

Details of any fire and actions taken will be recorded. Following any incident that has, or had the potential to cause significant pollution, senior management will review the incident, determine any preventative actions that could be taken to avoid such an incident, incorporate these into the Fire Risk Assessment and operational practice, and ensure all relevant staff are aware and appropriately trained.

6.3 Litter

Due to the nature of the material processed it is unlikely that litter will be generated.

Should any litter be found on site, or blow off site, the site supervisor will immediately organise its collection by site staff or in the event of severe litter blow litter pickers will be employed or hired in as necessary to keep the site and its surrounds tidy. Priority will be given to off-site areas with the tidiness of the site attended to once those are clear. The security fencing surrounding the site, along with the tree cover will minimise litter blow off-site.

All collected litter will be placed within a container and removed off site to a suitably permitted waste management facility.

6.4 Odour

The transfer, storage and processing of tyres is unlikely to produce significant odour issues. Odour is more likely to be generated during the granulation process; this is undertaken within the main process building where process temperatures have been reduced and production lines are fitted with extraction systems that are produce an exhaust suitable for recirculation back into the building.

The Technically Competent Manager or other responsible staff will monitor for odour on a daily basis, any significant event, and action taken will be recorded in the site diary.

If significant odours do occur, contingency measures will be considered.

6.5 Dust

Processing equipment located within the main building and identified as providing a significant potential source of dust is fitted with a bespoke dust extraction system.

The dust extraction systems will employ reverse jet filter technology. Clean air sucks any generated dust through a filter, which is then collected via a hopper in a bag. The system will be fully sealed to prevent any uncontrolled discharge of dust to atmosphere.

Dust collected by the extraction system is bagged for collection by a registered waste carrier.

As most areas of the site will be concreted the likelihood of external activities creating a dust problem are reduced. Site roads, and storage areas, will be damped down using a hose if necessary. Any operation or activity generating dust in excess of that which may be managed by the control systems will cease until alternative control measures can be implemented.

The Technically Competent Manager or their appointee will monitor the control of dust on a daily basis. Any adverse observation, and details of action taken, will be recorded.

6.6 Noise

The bulk of the processing machinery is located within the main process building. In order to reduce noise those parts of the process assessed as having the potential to provide the most significant source of noise have been located within the building. Further noise attenuation has been provided by way of acoustic barriers around those elements that generate the greatest noise. The building has also been fitted with additional cladding.

The site is located in a sparsely populated location. Nevertheless, the impact of noise to neighbours outside the site will be minimised. Processing in the external areas of the yard is limited to the shredding operation; the yard is bounded by high soil banks to the north; product storage provides a screen to the south and the process building shields activity in the yard from properties and receptors to the west and south west.

The impact of reverse beepers on the site machinery is regularly reviewed and the machinery is fitted with SMART beepers to further reduce the impact.

6.7 Vermin & Pests

Whilst the nature of the material received means it is unlikely that the waste management operations at the site will encourage vermin; checks will be made during daily visual inspections of the site. When and where necessary baiting and any other actions required to minimise vermin infestations will be undertaken. Records of visits and any action taken will be held in the Site Office.

6.8 Mud and Debris

The hard surfacing of all operating areas of the site means that the likelihood of operations generating mud is minimal.

All lorries collecting materials for onward use or disposal will be sheeted or netted before leaving the loading area. This will ensure that no debris is deposited on site or outside the site. In the event of any deposition, site surfaces and outside highway will be cleaned or picked immediately.

Vehicles will be visually inspected before they leave the site and advice given to drivers if there is a need to clean mud or debris before leaving.

All areas of the site will be cleaned as necessary by site personnel or hired in road sweepers, to prevent any mud or debris being deposited outside the site entrance/exit. A regular sweeping of all areas will be undertaken on a weekly basis to maintain cleanliness. In the event of any mud or debris being taken onto the highway clean-up will be organised without delay.

6.9 Accidents, Incidents & Non-conformances

Any accident, incident or non-conformance with the permit that has caused, is causing or may cause significant pollution will be recorded.

These will be investigated by a senior manager and where corrective action is identified as being required this will be recorded; responsibility will be allocated;

preventative or corrective actions specified, and completion required within a defined timeframe.

6.10 Complaints

All complaints relating to waste management activities covered by the environmental permit will be investigated.

The format of any investigation, and how it is recorded, will be determined by the type and scale of impact suspected. An investigation will incorporate some or all of the following, and supplemented where required, at the direction of a senior manager.

- Review details of complaint. Location, type of impact, visit location of complaint (if known), does current wind direction preclude site being source? Does the complaint relate to specific time or operation?
- Investigation of operational activities – What activities were occurring at the time of complaint?
- Investigation of operational controls. Are all specified operational controls being followed? Are they sufficient?
- Investigate other potential sources. E.g. Surrounding land, local industrial areas, etc.
- Corrective or Preventative Action – Where the investigation identifies this as being required this will be recorded; responsibility will be allocated; preventative or corrective actions specified, and completion required within a defined timeframe.
- Feedback – Provide feedback to complainant (if known) and regulatory authorities, as required.
- Review complaints on a quarterly basis to identify any trends.

6.11 Summary of Maintenance and Inspection Required

The following table sets out the maintenance and inspection schedule for key elements that relate to the conditions of the environmental permit, it also outlines

those responsible for undertaking the activity. Timescales are provided as a reasonable timeframe to aim for and are obviously dependent upon the availability of sub- contracted staff and equipment.

Table 5. Maintenance and Inspection

Equipment	Inspection Schedule	Look for	Responsible Person	Repair / Replacement Timescale
Hard Surfaces	1x per week	State of repair and damage	TCM or Site Manager	5 days
Security Fences	1 x per day visual	Damage	TCM or Site Manager	1 day temporary. 5 days permanent.
Litter blow, odour, dust, noise, birds, mud	Daily visual inspection, constant attention	Ensure no off-site problem	TCM, Site Manager and all site staff	Immediate cease of problem or removal of source from site.
Vermin and pests	Daily visual plus monthly visit	Absence of vermin and pests	Site Manager and Appointed contractor	Call in contractor to initiate immediate treatment
Drainage system, manholes & drains	Daily visual	Signs of damage.	TCM or Site Manager	5 days
Drainage system, manholes & drains	2 x annually	Blockages and cleanliness	TCM or appointed contractor	5 days
Silt Traps	Quarterly	Build-up of silt.	Site Manager	5 days
Information Board	1 x per week	Damage and up to date information	TCM or Site Manager	5 days
Fire Equipment	1 x per week visual Annual formal	Visual damage. Working order	Contractor Specialist	3 days
Fire alarm	Weekly	Working order	TCM or Site Manager	3 days
Fire Drill (inc. Emergency evacuation)	6-monthly	Adequate response from staff	TCM or Site Manager	Dependent upon corrective action required

Equipment	Inspection Schedule	Look for	Responsible Person	Repair / Replacement Timescale
Weighbridge	Annually	Accuracy	Appointed contractor	3 days
Roof drains and gutter, building structure, lights, ventilation and dust suppression.	Bi-annually	Continued use and effectiveness	Appointed contractor	5 days
Process machinery	Key equipment has automatic reporting and there is a programme of preventative maintenance	According to manufacturer's instructions – E.g. wear of blades, greasing of machines, and other routine checks required by manufacturer	TCM or appointed contractor	5 days
Backup generator	Automatic reporting via telemetry	Working order	Site Manager or appointed contractor	5 days

7 INFORMATION

7.1 Records & Reporting

The Permit requires the creation and retention of specific records; Condition 4.1 details how these must be kept, and for how long.

Records must be retained for 6 years unless they relate to off-site environmental or health effects, or the condition of the land or groundwater when they shall be retained until permit surrender. The following records are required by the permit;

Table 6. Records required by the permit

Cond	Requirement	Record
1.1.2	Records to demonstrate activities are managed in accordance with a management system	This Management Plan and associated documents
1.1.2	Records to demonstrate activities are managed by sufficient persons	Evidence of technical competence Staff training records EA assessment of senior managers
1.2.1	Accident Management Plan	Accident Risk Assessment & Management Plan held as Appendix C to the Management Plan
2.2.2	Records of all wastes accepted onto the site	Duty of Care Waste Transfer Notes
3.2.1	Records of all wastes sent off site from the activities	Weighbridge tickets
4.2.2	A quarterly summary report of waste types and quantities accepted and removed from the site. Submitted within one month of the end of each quarter. Q1 Jan – Mar by 30 th April Q2 Apr – Jun by 31 st July Q3 Jul – Sep by 31 st October Q4 Oct – Dec by 31 st January	Waste Return

7.2 Notification

Condition 4.3 specifies under what circumstances the Environment Agency must be notified. Whilst the table below summarises these, reference should always be made to the current Permit to confirm exact requirements.

Table 7. Notifications required by the permit

Cond	Requirement	When
4.3.1	Any malfunction, breakdown or failure of equipment or techniques which has caused, is causing or may cause significant pollution	Without delay
4.3.1	Any accident of fugitive emission which has caused, is causing or may cause significant pollution	Without delay
4.3.2	Written confirmation of actual or potential pollution incidents.	Within 24 hours
4.3.3	Written notification of permanent cessation of activities	Prior to event
4.3.3	Written notification of cessation of all or part of the activities for a period likely to exceed 3 months	Prior to event
4.3.3	Written notification of resumption of the operation of all or parts of the activities	Prior to event
4.3.4	If the EA has requested in writing when monitoring or spot sampling is undertaken, then this information must be provided	14 days prior
4.3.5	Changes in technically competent management	Within 7 days of change
4.3.6	Conviction of permit holder, or any relevant offence	Within 14 days
4.3.7	Appeal against conviction and of outcome of appeal	Within 14 days
4.3.8	Specified changes to company details	Within 14 days
4.3.9	Commencement of any of the activities	7 days in advance

7.3 Security

Records shall be kept securely within the site office. Where held electronically these shall be backed up on a regular basis and a copy held off site.

7.4 Availability

In accordance with Condition 4.1.2 any record requested in writing by the Environment Agency, will be supplied within 14 days.

Appendix D – WAMITAB Certificate



Qualification Title:

WAMITAB Level 4 Medium Risk Operator Competence for Non-Hazardous Waste Treatment and Transfer

Qualification Accreditation Number:

601/8528/4

This Certificate is awarded to

Magda Jackson

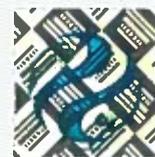
Awarded: 21/06/2018

Serial No:30742/MROC1/1

Authorised

A handwritten signature in black ink, appearing to read "Chris James".

**Chris James
Chief Executive Officer, WAMITAB**



The qualifications regulators logos on this certificate indicate that the qualification is accredited only for England, Wales and Northern Ireland. Qualifications Wales regulates this qualification where it is awarded to learners assessed wholly or mainly in Wales.

00125312



Credit certificate

This certificate determines credit awarded to:

Magda Jackson

Units gained:

Credit Value Credit Level

A/508/0756	Maintain health and safety in the waste resource management industry	4	4
F/508/0757	Manage the environmental impact of work activities	3	4
F/508/0760	Manage the movement, sorting and storage of waste	5	4
J/508/0887	Manage the reception of non-hazardous waste	6	3
K/508/0980	Manage transfer and disposal from non-hazardous waste treatment and recovery operations	8	4
M/508/0995	Manage site operations for the treatment of non-hazardous waste	8	4

Awarded: 21/06/2018

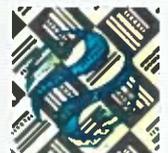
Serial No.: 30742/OCS01/1

Authorised

Chris James
Chief Executive Officer, WAMITAB



For more information see www.ofqual.gov.uk



The qualifications regulators logos on this certificate indicate that the qualification is accredited only for England, Wales and Northern Ireland. Qualifications Wales regulates this qualification where it is awarded to learners assessed wholly or mainly in Wales.

00125302



Certificate No. OCC8759

Operator Competence Certificate

Title:

Non-Hazardous Waste Treatment and Transfer

This Certificate is awarded to

Magda Jackson

Awarded: 21/06/2018

Authorised

A handwritten signature in black ink, appearing to read "D. James".

WAMITAB Chief Executive Officer

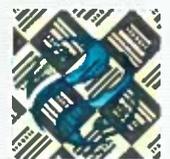
A handwritten signature in black ink, appearing to read "A. Clark".

CIWM Chief Executive Officer



**The Chartered Institution
of Wastes Management**

This certificate is jointly awarded by WAMITAB and the Chartered Institution of Wastes Management (CIWM) and provides evidence to meet the Operator Competence requirements of the Environmental Permitting (EP) Regulations, which came into force on 6 April 2008.



00125288



CIWM

Continuing Competence Certificate

This certificate confirms that

Magda Jackson

Has met the relevant requirements of the Continuing Competence scheme for the following award(s) which will remain current for two years from 07/10/2024

GKA	Generic Knowledge Assessment
TSNH	Transfer - Non Hazardous Waste
TMNH	Treatment - Non Hazardous Waste

Expiry Date:
07/10/2026

Verification date: 31/07/2024

Authorised:

Responsible Officer

Learner ID: 30742

Certificate No.: 5263690

Date of Issue: 07/10/2024

CIWM Chief Executive Officer



The Chartered Institution
of Wastes Management



Appendix E – Certificate of Incorporation

FILE COPY



**CERTIFICATE OF INCORPORATION
OF A PRIVATE LIMITED COMPANY**

Company No. 4012599

The Registrar of Companies for England and Wales hereby certifies that
MURFITTS RUBBER INDUSTRIES LIMITED

is this day incorporated under the Companies Act 1985 as a private
company and that the company is limited.

Given at Companies House, Cardiff, the 12th June 2000



N04012599H



C O M P A N I E S H O U S E

C007

FILE COPY



**CERTIFICATE OF INCORPORATION
ON CHANGE OF NAME**

Company No. 4012599

The Registrar of Companies for England and Wales hereby certifies that
MURFITTS RUBBER INDUSTRIES LIMITED

having by special resolution changed its name, is now incorporated
under the name of
MURFITTS INDUSTRIES LIMITED

Given at Companies House, Cardiff, the 4th February 2002



C040125993



HC006B

Appendix F – Residence Time Calculations



Project Triumph – ELT Crumb Pyrolysis
Syngas Combustion Residence Time Calculations
August 2025

Introduction

The Michelin Production Plant in Stoke-on-Trent currently receives a significant number of ELTs where they are stored and processed ready for re-treading or recycling. The proposed development will utilise tyre crumb produced from ELTs received at the Michelin Production Plant, as well as imported tyres from elsewhere, that are not suitable for re-treading.

The purpose of the proposed facility is to convert End of Life Tyres (ELTs) into Recovered Carbon Black (rCB), Tyre Pyrolysis Oil (TPO) and Steam. This shall be based on a process that has been developed by Murfitts Industries Limited, using a proven pyrolysis technology.

The proposed development displaces the need for virgin fossil minerals and materials in the production of fuels and new tyres and will provide energy in the form of steam to the Michelin Production Plant to reduce the carbon footprint of the entire manufacturing process. The proposed development builds a circular economy, allowing the carbon black in end-of-life tyres to be recycled into new tyres and other rubber products, and produces TPO to be used as renewable fuel or fossil oil replacement.

In addition to the recovered carbon black (rCB) and the tyre pyrolysis oil (TPO) the facility will also produce syngas. The syngas is combusted to generate steam, which is used in Michelin's manufacturing plant. The syngas is classified as a waste material because it is derived from end of life tyres, which are also classified as a waste material.

Murfitts Industries Limited are making a SWIP permit application for the pyrolysis of tyre crumb produced from end of life tyres.

Section 4.3.2 of the Industrial Emissions Directive (IED) requires *that plants shall be designed, equipped, built and operated in such a way that the gas resulting from the incineration or co-incineration of waste is raised in a controlled and homogeneous fashion and even under the most unfavourable conditions, to a temperature of at least 850 °C for at least two seconds. The requirement to achieve the minimum temperature and residence time set out above, shall apply after the last injection of combustion air.*

The operator must provide evidence at the application stage that the temperature and residence time requirements under normal operating conditions (i.e. maximum throughput) and the most unfavourable conditions are capable of being achieved.

This document provides the calculation based evidence to demonstrate the combustion system will provide a residence time of 2 seconds after the last injection of air with a temperature in excess of 850°C.

Operating Conditions

Two operating conditions have been assessed, these being maximum continuous rating (MCR) and a load case processing 130% of the MCR condition. The 130% MCR condition represents the most unfavourable operating condition, in that it is the operating condition that gives rise to the largest flue gas volume and hence the shortest flue gas residence time.

Table 1 provides a summary of the syngas, combustion conditions and flue gas arising. And shows that with the design condition of operating the combustor at 1,000°C the flue gas volume rate is 10.07Am³/s at MCR and 14.12Am³/s at the least favourable operating condition.

Combustion & Flue Gas		100% MCR	130% MCR
Syngas Flow Rate	kg/h	273	355
Syngas CV	MJ/kg	38.3	38.3
Syngas Fuel Duty	kW	2,904	3,776
Natural Gas Anchor Flame	kg/h	11.0	38.0
Natural Gas Fuel Duty	kW	150	509
Total Combustion Air Mass Flow	kg/h	8,414	11,808
Flue Gas Temperature	C	1,000	1,000
Flue Gas Mass Flow (inc 15% FGR)	kg/h	10,003	14,031
Flue Gas Volume Flow (inc 15% FGR)	Nm ³ /hr	7,772	10,902
Flue Gas Volume Flow (inc 15% FGR)	Nm ³ /s	2.16	3.03
Flue Gas Volume Flow (inc 15% FGR)	Am³/s	10.07	14.12

Table 1 Summary of Syngas, Combustion Conditions and Flue Gas Arising

The outline arrangement for the combustor, residence chamber and boiler are shown in Figure 1. From figure 1 it can be seen the internal dimensions of the residence chamber after the last injection of air gives a total cylinder with length of 9.33m and diameter increasing from 1.2 to 1.4m and to 2.25m.

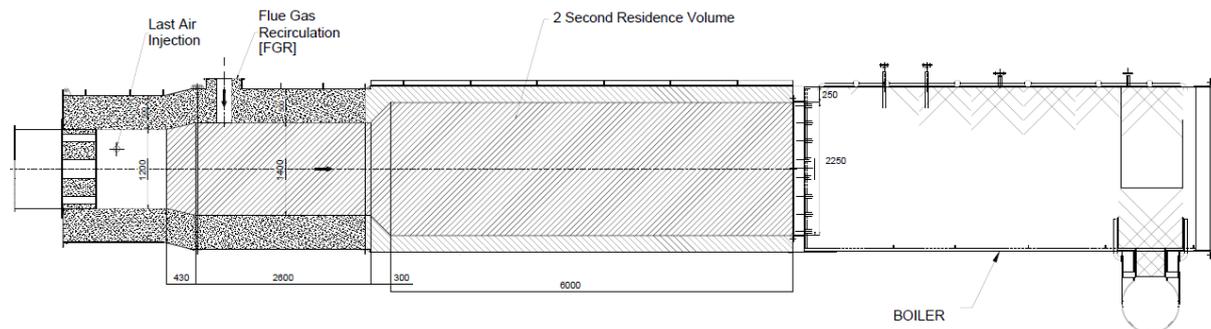


Figure 1 Outline Arrangement of the Combustor, Residence Chamber and Boiler

These dimensions are used to calculate the volume available for the 2 seconds residence time. The volumes being reported in Table 2.

Combustion Chamber		
Combustion Chamber Volume	m ³	4.57
Baffle Ring Volume	m ³	0.68
Residence Chamber Gas Volume	m ³	23.86
Total Volume	m ³	29.11

Table 2 Flue Gas Residence Volume

Using the volume flow rates in Table 1 and the residence chamber volume in Table 2 the residence time can be calculated.

$$\text{Residence time (s)} = \frac{\text{Combustion Gas Volume Flow Rate (Am}^3\text{/s)}}{\text{Residence Chamber Volume (m}^3\text{)}}$$

This give the following

100% MCR Residence Time = 2.99s

130% MCR Residence Time = 2.1s

Both of these are in excess of the 2 second residence time requirement and are based on a conservative approach of applying a 1,000°C combustion temperature, which has a larger volume than the same gas at 850°C.

Conclusion

The above data and calculations demonstrate that under conservative operating conditions the proposed design will achieve a 2 second residence time after the last injection of air with a temperature in excess of 850°C. Therefore satisfying the requirements of section 4.3.2 of the IED.



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