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BAT Assessment

v1.2

Environmental and sustainability solutions provided to
Haworth Scouring Company Limited



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1.0 INTRODUCTION

Walker Resource Management Ltd (WRM) have been commissioned by Haworth Scouring Company Limited (hereon referred to as 'HSC') with undertaking a Best Available Techniques (BAT) Assessment of their proposed Anaerobic Digestion facility at their site in Bradford, West Yorkshire, BD3 9SX. This BAT Assessment forms part of the application to vary Haworth Scouring's existing bespoke installation environmental permit (reference EPR/BS60251F/V005) to insert an Anaerobic Digestion stage to the current effluent treatment system on site. This BAT Assessment addresses how the site meets BAT standards contained within the Best Available Techniques (BAT) Reference Document for Waste Treatment (BREF). The BREF 2018 document, as well as the Commission Implementing Decision (EU) 2018/1147, have been consulted in order to ensure this BAT Assessment meets the requirements of legislation.

1.1 Legislative Background

As required under Directive 2010/75/EU of the European Parliament and of the Council of 24 November 2010 on industrial emissions (Integrated Pollution Prevention and Control), the Environment Agency periodically review existing Environmental Permits contents. This requirement of the Environment Agency, as well as other wider requirements of the IED, are transposed into UK law through the Environmental Permitting (England and Wales) Regulations 2016. As part of this review the Environment Agency will amend the contents of permits and add any applicable conditions as required by the latest Best Available Technique Reference document generated at EU level. This process ensures the permitting process is in line with the latest set of BAT standards.

In order to undertake this BAT Assessment, the following documents have been consulted to ensure the site meets the required standards of compliance.

- *Commission Implementing Decision (EU) 2018/1147*
- *Best Available Techniques (BAT) Reference Document for Waste Treatment 2018 (BREF)*

1.2 Definition of Best Available Technique

The IED (Directive 2010/75/EU) define BAT as:

"The most effective and advanced stage in the development of activities and their methods of operation which indicates the practical suitability of particular techniques for providing in

principle the basis for emission limit values designed to prevent and where that is not practicable, generally reduce emission and the impact on the environment as a whole”.

Article 3 of the IED further defines the component parts of BAT as:

- “Best” – means the most effective techniques for achieving a high level of protection of the environment as a whole.
- “Available” – means techniques developed on a scale which allows them to be used in the relevant industrial sector, under economically and technically viable conditions, taking into account the costs and advantages.
- “Techniques” – includes both the technology and the way the installation is designed, built, maintained, operated and decommissioned.

BAT may be demonstrated by either:

- Compliance with the sector-level, indicative BAT performance described in the Sector Guidance Notes (SGNs) produced by the Environment Agency and in the European Commission ‘Reference Documents on BAT’ (BREFs); or
- By conducting an installation-specific options appraisal of candidate techniques.

2.0 SITE DETAILS

2.1 Site Address

Cashmere Works
Birksland Street
Bradford
West Yorkshire
BD3 9SX

2.2 Operational Location

Site Grid Reference: Easting: 417900, Northing: 432700

2.3 Site Description

The site is situated 1.3km east of Bradford city centre and comprises an irregular area of approximately 8 acres. The site is surrounded by mixed industrial units and some residential properties. The installation is a textiles plant which washes and dries raw fleece wool to produce clean, dry wool fibre for sale or onward processing. The main activities are receipt of raw materials and fuels, product processing (heating, drying, washing, and cleaning) and despatch of finished product. Ancillary processes include on-site treatment of effluents and recovery of wool grease.

2.4 Permits and Licenses

HSC currently hold a bespoke installation environmental permit (reference EPR/BS60251F/V005) for the pre-treating (by operations such as washing, bleaching, or mercerisation) or dyeing fibres or textiles in plant with a treatment capacity of more than 10 tonnes per day. This activity is limited to the scouring of loose wool. Directly associated activities also include the operation of a natural gas fired boiler and a natural gas fired CHP engine.

HSC intend to insert an anaerobic digestion (AD) stage prior to the existing effluent treatment system on site. An additional CHP unit will be co-installed at the anaerobic digestion site, and a permit variation is required to include this. Digestion of the effluent will produce a biogas that will be burned in the CHP to produce electricity and heat which will be used on the site. Anaerobic treatment, as well as the production of biogas for on-site power generation, will render the aqueous effluent easier to treat in the existing treatment system, reduce chemical usage and also reduce the amount of sludge solid waste being produced.

3.0 BAT ASSESSMENT

The first phase of the process is to assess site activities and the associated permit management system against general BAT conclusions. Following this, sections 3.2 and 3.3 contain the assessment against BAT conclusions for the biological treatment of waste as well as the BAT conclusions for the anaerobic treatment of waste. The following tables have been produced from the Annex contained within the Commission Implementing Decision (EU) 2018/1147. Areas which don't apply to the operations at the facility due to site specific reasons have been excluded from the table. Please note, as stated within the Commission Implementing Decision (EU) 2018/1147, the scope (e.g. level of detail) and nature of how the site addresses the BAT conclusions will generally be related to the nature, scale and complexity of the installation, and the range of environmental impacts it may have (determined also by the type and amount of wastes processed).

3.1 General BAT Conclusions

Overall Environmental Performance		
BAT Conclusion No	BAT Guidance (Adapted from Annex I of Directive 2010/75/EU)	Haworth Scouring Company Permit Documents
01	<p>In order to improve the overall environmental performance, BAT is to implement and adhere to an environmental management system (EMS) that incorporates all of the following features (where applicable):</p> <p>I. commitment of the management, including senior management;</p>	<p>HSC demonstrate a proactive approach towards maintaining high environmental and overall business performance. HSC operate an externally audited Management System (EMS) that is certified to ISO 14001 and ISO 9001.</p> <p>The managing director, Richard Norris, is responsible for the sites Environmental & Chemical Management Policy, demonstrating senior management commitment. The policy details the measures being taken by the site to improve their environmental performance, such as implementing procedures to lower energy and water usage and projects such as the implementation of the anaerobic digester and CHP unit. The policy is reviewed by senior management no less than annually during the management review. Similarly, an annual EMS management review takes place covering</p>

Overall Environmental Performance	
<p>II. definition, by the management, of an environmental policy that includes the continuous improvement of the environmental performance of the installation;</p> <p>III. planning and establishing the necessary procedures, objectives and targets, in conjunction with financial planning and investment;</p> <p>IV. implementation of procedures paying particular attention to:</p> <ul style="list-style-type: none"> (a) structure and responsibility, (b) recruitment, training, awareness and competence, (c) communication, (d) employee involvement, (e) documentation, (f) effective process control, (g) maintenance programmes, (h) emergency preparedness and response, (i) safeguarding compliance with environmental legislation; 	<p>the implementation and overall compliance against Environmental Permitting Regulations. Should any operational or regulatory changes occur, the EMS is reviewed and updated if necessary.</p> <p>HSC have documented environmental objectives and targets which are implemented throughout the company. These include the targets/goals and procedures to reduce energy and water consumption and to increase the use of renewable energy sources. HSC are proactive in researching cleaner technologies that could improve their carbon footprint, as proven by the implementation of the anaerobic digester in order to increase their renewable energy usage and reduce chemical usage.</p> <p>HSC are able to maintain high levels of process control through the combination of various different operational procedures and monitoring of the SCADA system. The regular monitoring and measurement of site processes and any environmental impacts such as odour, noise, and litter are recorded and available for inspection should it be requested. HSC also conduct and record daily site checks to assess a number of variables within the environmental permit documents, including, but not limited to site security, odour, litter, and drainage systems. The effectiveness of individual site procedures is regularly evaluated through various meetings, such as internal and external audits and management reviews.</p> <p>Clear and coherent communication is fundamental to effective process operation on site. Senior Management are responsible for ensuring that internal communications take place. HSC communicate information using a variety of media, including, but not limited to team meetings, toolbox talks and training records, shared file server and notice boards.</p> <p>HSC operate a strict maintenance regime and equipment used is of sufficient capacity to allow down time for routine maintenance, calibration and servicing as recommended by the manufacturer. All</p>

Overall Environmental Performance	
<p>V. checking performance and taking corrective action, paying particular attention to:</p> <ul style="list-style-type: none"> (a) monitoring and measurement (see also the JRC Reference Report on Monitoring of emissions to air and water from IED installations – ROM), (b) corrective and preventive action, (c) maintenance of records, (d) independent (where practicable) internal or external auditing in order to determine whether or not the EMS conforms to planned arrangements and has been properly implemented and maintained; <p>VI. review, by senior management, of the EMS and its continuing suitability, adequacy and effectiveness;</p> <p>VII. following the development of cleaner technologies;</p>	<p>routine maintenance and any incidents involving plant or equipment are recorded. Additionally, operator pre-use checks are completed to assess the general condition of the machines to identify any defects.</p> <p>The operator’s approach to managing accidents onsite is documented within a dedicated Accident Management Plan. The document lists key emergency contact details and has comprehensively evaluated a range of hazards and how they are monitored and mitigated on site. The Accident Management Plan is supported by a range of procedures to minimise the potential occurrence of accidents on site. The site also has a comprehensive Odour Management Plan.</p> <p>In line with ISO14001 requirements, HSC have developed an Environmental Legislation Register to record all of their statutory obligations. A legal audit which reviews performance against each obligation is undertaken annually.</p>

Overall Environmental Performance		
	<p>VIII. consideration for the environmental impacts from the eventual decommissioning of the plant at the stage of designing a new plant, and throughout its operating life;</p> <p>IX. application of sectoral benchmarking on a regular basis;</p> <p>X. waste stream management (see BAT 2);</p> <p>XI. an inventory of wastewater and waste gas streams (see BAT 3);</p> <p>XII. residues management plan (see description in Section 6.5);</p> <p>XIII. accident management plan (see description in Section 6.5);</p> <p>XIV. odour management plan (see BAT 12);</p> <p>XV. noise and vibration management plan (see BAT 17).</p>	
02	<p>In order to improve the overall environmental performance of the plant, BAT is to use all of the techniques given below.</p>	<p>HSC operate the plant using an approach whereby no materials are accepted onto site unless an input supply agreement has been entered into and the delivery of materials has been pre-booked to the site. This controls the likelihood of any non-permitted wastes entering the site. A contractual arrangement (input materials supply agreement) is made with each material supplier including criteria for acceptance/rejection of loads delivered to the facility.</p>

Overall Environmental Performance	
<p>a) Set up and implement waste characterisation and pre-acceptance procedures – These procedures aim to ensure the technical (and legal) suitability of waste treatment operations for a particular waste prior to the arrival of the waste at the plant. They include procedures to collect information about the waste input and may include waste sampling and characterisation to achieve sufficient knowledge of the waste composition. Waste pre-acceptance procedures are risk-based considering, for example, the hazardous properties of the waste, the risks posed by the waste in terms of process safety, occupational safety and environmental impact, as well as the information provided by the previous waste holder(s).</p> <p>b) Set up and implement waste acceptance procedures – Acceptance procedures aim to confirm the characteristics of the waste, as identified in the pre-acceptance stage.</p>	<p>In line with the requirements of the environmental permit, HSC keep a record of the location and quantity of materials on site, the destination and quantities dispatched offsite, and the annual tonnage of fibres treated. This information is supplied in the annual waste returns. The SCADA system will manage material through the anaerobic digestion process.</p> <p>HSC has been accredited and Soil Association certified to GOTS and OEKO-TEX standards for their undyed fibres, scoured wool and combed wool tops.</p>

Overall Environmental Performance	
	<p>These procedures define the elements to be verified upon the arrival of the waste at the plant as well as the waste acceptance and rejection criteria. They may include waste sampling, inspection and analysis. Waste acceptance procedures are risk-based considering, for example, the hazardous properties of the waste, the risks posed by the waste in terms of process safety, occupational safety and environmental impact, as well as the information provided by the previous waste holder(s).</p> <p>c) Set up and implement waste tracking system and inventory – A waste tracking system and inventory aim to track the location and quantity of waste in the plant. It holds all the information generated during waste pre-acceptance procedures (e.g. date of arrival at the plant and unique reference number of the waste, information on the previous waste holder(s), pre-acceptance and</p>

Overall Environmental Performance	
	<p>acceptance analysis results, intended treatment route, nature and quantity of the waste held on site including all identified hazards), acceptance, storage, treatment and/or transfer off site. The waste tracking system is risk-based considering, for example, the hazardous properties of the waste, the risks posed by the waste in terms of process safety, occupational safety and environmental impact, as well as the information provided by the previous waste holder(s).</p> <p>d) Set up and implement an output quality management system – This technique involves setting up and implementing an output quality management system, so as to ensure that the output of the waste treatment is in line with the expectations, using for example existing EN standards. This management system also allows the performance of the waste treatment to be monitored and optimised, and for this purpose may</p>

Overall Environmental Performance		
	include a material flow analysis of relevant components throughout the waste treatment. The use of a material flow analysis is risk-based considering, for example, the hazardous properties of the waste, the risks posed by the waste in terms of process safety, occupational safety and environmental impact, as well as the information provided by the previous waste holder(s).	
03	<p>In order to facilitate the reduction of emissions to water and air, BAT is to establish and to maintain an inventory of wastewater and waste gas streams, as part of the environmental management system (see BAT 1), that incorporates all of the following features:</p> <p>(i) information about the characteristics of the waste to be treated and the waste treatment processes, including:</p>	<p>Currently, effluent from the scouring process is directed to the on-site effluent treatment plant before being discharged to the mains sewer under a permitted discharge consent. The effluent is transported to the treatment plant either in water resistant concrete lined channels or in stainless steel piping to minimise leakage to the environment.</p> <p>Water collection on the ground of the site and from roofs and gutters is channelled to drains around the scour, warehouse and loading areas. No process water is discharged to surface waters and no untreated effluent discharged to the sewer under any circumstances.</p> <p>HSC have an SOP in place for the monitoring of effluent. A daily flow reading is taken of the bore hole meter and trade effluent meter by the effluent plant operative, and the result is entered into the daily COD spread sheet. This is checked daily by the effluent plant manager and if the readings are >20%, an investigation is carried out and the results recorded in the Non-Conformance Register.</p>

Overall Environmental Performance																		
<p>(a) simplified process flow sheets that show the origin of the emissions;</p> <p>(b) descriptions of process-integrated techniques and wastewater/waste gas treatment at source including their performances;</p> <p>(ii) information about the characteristics of the wastewater streams, such as:</p> <p>(a) average values and variability of flow, pH, temperature, and conductivity;</p> <p>(b) average concentration and load values of relevant substances and their variability (e.g. COD/TOC, nitrogen species, phosphorus, metals, priority substances/micropollutants);</p> <p>(c) data on biodegradability (e.g. BOD, BOD to COD ratio, Zahn-Wellens test, biological inhibition potential (e.g.</p>	<p>Periodically, Yorkshire Water collect samples for testing, and a laboratory analysis report is generated showing limits and readings. Quarterly samples are collected from companies for effluent, pesticides, dust, and sludge. These are sent to appropriate testing labs, and the results are used for the annual returns to the EA.</p> <p>The only Point Source Emission to Water (other than sewer) is W1 – Uncontaminated surface water runoff from the roof and main yard, which is noted in the site’s existing Environmental Permit. No parameters or limits are set for this emission.</p> <p>The sole source of feedstock into the AD Plant is the wastewater from the textiles plant that is already noted within the site’s existing Environmental Permit. There is no other feedstock. Therefore, the wastewater from the AD Process is characterised by the same parameters as the wastewater from the existing effluent treatment plant. Aqueous effluent that has been treated by the AD plant will then be transferred to the existing effluent treatment plant. These parameters and their permitted limits, which are noted in Table S3.3 of the site’s existing Environmental Permit include the following:</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: left;">Source</th> <th style="text-align: left;">Parameter</th> <th style="text-align: left;">Limit (incl. Unit)</th> <th style="text-align: left;">Reference period</th> <th style="text-align: left;">Monitoring frequency</th> <th style="text-align: left;">Monitoring standard or method</th> </tr> </thead> <tbody> <tr> <td rowspan="2" style="vertical-align: top;">Wastewater from AD plant</td> <td>Daily Flow</td> <td>850m³/day</td> <td>24-hour total</td> <td>Continuous</td> <td>SCA Estimation of flow and load, ISBN 011752364X</td> </tr> <tr> <td>pH</td> <td>6-10</td> <td>Instantaneous</td> <td>Continuous</td> <td>BS ISO 10523</td> </tr> </tbody> </table>	Source	Parameter	Limit (incl. Unit)	Reference period	Monitoring frequency	Monitoring standard or method	Wastewater from AD plant	Daily Flow	850m ³ /day	24-hour total	Continuous	SCA Estimation of flow and load, ISBN 011752364X	pH	6-10	Instantaneous	Continuous	BS ISO 10523
Source	Parameter	Limit (incl. Unit)	Reference period	Monitoring frequency	Monitoring standard or method													
Wastewater from AD plant	Daily Flow	850m ³ /day	24-hour total	Continuous	SCA Estimation of flow and load, ISBN 011752364X													
	pH	6-10	Instantaneous	Continuous	BS ISO 10523													

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<p>inhibition of activated sludge)) (see BAT 52); (iii) information about the characteristics of the waste gas streams, such as:</p> <p>(a) average values and variability of flow and temperature;</p> <p>(b) average concentration and load values of relevant substances and their variability (e.g. organic compounds, POPs such as PCBs);</p> <p>(c) flammability, lower and higher explosive limits, reactivity;</p> <p>(d) presence of other substances that may affect the waste gas treatment system or plant safety (e.g. oxygen, nitrogen, water vapour, dust).</p>		Settleable solids	5,000mg/l		Monthly	SCA Book 105, Suspended, Settleable and Total Dissolved Solids in Waters and Effluents, 1980 ISBN 011751957X	
		Chemical oxygen demand	45,000mg/l	Spot sample	Monthly	ISO 6060:1989, Water Quality – Determination of chemical oxygen demand	
		HCB and isomers	1 µg/l		Quarterly	BS6069: Section 2.58 1997 Determination of highly volatile halogenated hydrocarbons; Gas chromatographic methods.	
		HCH and isomers	5 µg/l		Quarterly	BS 6068 Section 2.57: 1997	
		Aldrin	1 µg/l		Quarterly	Determination of	

Overall Environmental Performance							
			Dieldrin	1 µg/l		Quarterly	Certain Organochlorine Insecticides and Polychlorinated Biphenyls and Chlorobenzene - Gas Chromatographic Method After Liquid - Liquid Extraction
			Endrin	1 µg/l		Quarterly	
			Endosulphan	1 µg/l		Quarterly	
			DDT and isomers	3 µg/l		Quarterly	
			Propetamphos	150 µg/l		Quarterly	BS EN 12918:1999, BS 6068-2.67:1999 Determination of parathion, parathion methyl and some other organophosphorus compounds in water by dichloromethane extraction and gas
			Diazinon	800 µg/l		Quarterly	
			Chlorfenvinphos	35 µg/l		Quarterly	

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							chromatographic analysis.
			Cypermethrin	110 µg/l		Quarterly	Standing Committee Analysts – Book 146 ISBN 0117523736 Determination of Synthetic Pyrethroid Insecticides in Water
			Cyfluthrin	1 µg/l		Quarterly	
			Permethrin	3.5 µg/l		Quarterly	
			Mercury and its compounds, expressed as mercury (Total Hg)	10 µg/l		Quarterly	BS6068, Section 2.60: 1998, Determination of 33 elements by inductively coupled plasma atomic emission spectroscopy.
			Cadmium and its compounds, expressed as cadmium (Total Cd)	20 µg/l		Quarterly	
			Flucofuron	100 µg/l		Quarterly	Standing Committee of
			Sulcofuron	250 µg/l		Quarterly	

Overall Environmental Performance							
							Analysts – Book 127 ISBN 0117521515 The Determination of Carbamates, Thiocarbamates, Related Compounds and Ureas in Water
<p>The profile of the emissions from the effluent treatment plant shall not change as a result of the installation of the AD plant which is effectively a pre-treatment plant to the effluent treatment plant. No additional substances or chemicals shall be added. The emissions from the effluent treatment plant shall continue to remain as it currently does and shall continue to be bound by the pollutant emission limit values as presented above.</p> <p>The biogas produced by the AD plant will be continuously monitored by the SCADA system for volume as composition as per the requirements of an AD facility.</p> <p>HSC have developed process flow diagrams which are included in their operating procedures and as part of their permit application, and the SCADA system also contains a fully electronic set up of the process. Both of these elements are seen to provide the descriptions of the process-integrated techniques. As this is the case the operator is of the view that a number of elements in this BAT conclusion are not required.</p>							

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04	<p>In order to reduce the environmental risk associated with the storage of waste, BAT is to use all of the techniques given below.</p> <p>a) Optimised storage location – This includes techniques such as:</p> <ul style="list-style-type: none"> – the storage is located as far as technically and economically possible from sensitive receptors, watercourses, etc.; – the storage is located in such a way so as to eliminate or minimise the unnecessary handling of wastes within the plant (e.g. the same wastes are handled twice or more or the transport distances on site are unnecessarily long). <p>b) Adequate storage capacity – Measures are taken to avoid accumulation of waste, such as:</p> <ul style="list-style-type: none"> – the maximum waste storage capacity is clearly established and not exceeded taking into account the characteristics of the wastes (e.g. 	<p>With regards to condition A, it is of the view of the operator that it is not applicable, as the site is well established and has been operating for a number of years and this is generally applicable to new plants. There are a number of sensitive receptors within 250m of the facility (due to its location within an industrial area in Bradford city centre) but material is stored within a dedicated, enclosed area in order to reduce any impact.</p> <p>In line with the requirements of the environmental permit, HSC keep a record of the location and quantity of materials on site, the destination and quantities dispatched offsite, and the annual tonnage of fibres treated. This information is supplied in the annual waste returns. The SCADA system will manage material through the anaerobic digestion process.</p> <p>The maximum residence times and quantities of materials are well established and documented within the sites procedures i.e., wool-washing process effluent is held on site for a maximum of 7 days with a maximum quantity of 350 tonnes on site at any one time. Once the wool-washing process effluent has entered the digestion tanks, it will be held on site for a maximum of 3 days with a maximum quantity of 128 tonnes in each tank.</p> <p>All chemicals used are kept within appropriate containers within a bunded area on site. Safety Data Sheets are readily available. Chemicals used for GOTS organic scourings are on the GOTS approved lists and letters of approval are available.</p> <p>The site does not accept or process hazardous waste.</p>

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	<p>regarding the risk of fire) and the treatment capacity;</p> <ul style="list-style-type: none"> – the quantity of waste stored is regularly monitored against the maximum allowed storage capacity; – the maximum residence time of waste is clearly established. <p>c) Safe storage operation – This includes measures such as:</p> <ul style="list-style-type: none"> – equipment used for loading, unloading and storing waste is clearly documented and labelled; – wastes known to be sensitive to heat, light, air, water, etc. are protected from such ambient conditions; – containers and drums are fit for purpose and stored securely. <p>d) Separate area for storage and handling of packaged hazardous waste - When relevant, a dedicated area is used for storage and handling of packaged hazardous waste.</p>	
05	In order to reduce the environmental risk associated with the handling and transfer of waste, BAT is to set up and	The overall site procedures, including those associated with the handling and transfer of waste, is managed by a Technically Competent Person. Site Operatives receive training covering all areas of

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	<p>implement handling and transfer procedures.</p> <p><i>Description</i></p> <p>Handling and transfer procedures aim to ensure that wastes are safely handled and transferred to the respective storage or treatment. They include the following elements:</p> <ul style="list-style-type: none"> – handling and transfer of waste are carried out by competent staff; – handling and transfer of waste are duly documented, validated prior to execution and verified after execution; – measures are taken to prevent, detect and mitigate spills; – operation and design precautions are taken when mixing or blending wastes (e.g. vacuuming dusty/powdery wastes). <p>Handling and transfer procedures are risk-based considering the likelihood of accidents and incidents and their environmental impact.</p>	<p>the management systems, including the handling and transfer of waste. Site operatives are also trained on spill prevention, spill response procedures, and the use of spill kits.</p> <p>All areas of impermeable pavement, sealed drainage systems, digestate tanks, covered buildings, roofed areas, other containers and storage areas are inspected on a regular basis. Any defects are logged in and actioned appropriately.</p> <p>Pipework shall be officially inspected monthly. In addition to this, site operatives and management tour the site daily and if anything untoward is detected then a formal inspection can be triggered. The Site Manager or site supervisor shall also perform a weekly check of the area for any potential leaks.</p> <p>Any defects across the plant are reported, and corrective actions tracked in line with the maintenance check sheets and corrective action log. If required, advice should be sought from a competent expert. This ensures the continuing integrity and fitness for purpose of the plant’s construction. Daily informal site walkovers are undertaken by the Operations Manager, or a delegated individual, to inspect the site, the results of these inspections are recorded.</p> <p>In the event of any damage occurring which breaches the integrity of the engineered containment so that it no longer meets the specified standards, the licence holder shall cease operations, notify the EA immediately, and shall not recommence until it has been repaired to a standard at least as good as the original specification.</p>

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Monitoring		
BAT Conclusion No	BAT Guidance (Adapted from Annex I of Directive 2010/75/EU)	Haworth Scouring Company Permit Documents
06	For relevant emissions to water as identified by the inventory of waste water streams (see BAT 3), BAT is to monitor key process parameters (e.g. waste water flow, pH, temperature, conductivity, BOD) at key locations (e.g. at the inlet and/or outlet of the pretreatment, at the inlet to the final treatment, at the point where the emission leaves the installation).	<p>HSC have an SOP in place for the monitoring of effluent. A daily flow reading is taken of the bore hole meter and trade effluent meter by the effluent plant operative, and the result is entered into the daily COD spread sheet. This is checked daily by the effluent plant manager and if the readings are >20%, an investigation is carried out and the results recorded in the Non-Conformance Register. When carrying out the turbidity reading, the effluent plant operative will note the decanter feed rate and compare against the current drain flow rate from the MCERTS meter. This information is displayed on the effluent panel view in the effluent treatment plant (ETP) control room. If the reading is >20% different, it must be investigated and, if appropriate, reported to the quality manager of effluent manager.</p> <p>Periodically, Yorkshire Water collect samples for testing, and a laboratory analysis report is generated showing limits and readings. Quarterly samples are collected from companies for</p>

Monitoring		
		<p>effluent, pesticides, dust, and sludge. These are sent to appropriate testing labs, and the results are used for the annual returns to the EA.</p> <p>The SCADA system will manage material through the anaerobic digestion process.</p>
07	<p>BAT is to monitor emissions to water with at least the frequency given below, and in accordance with EN standards. If EN standards are not available, BAT is to use ISO, national or other international standards that ensure the provision of data of an equivalent scientific quality.</p> <p>See section 1.2 of <i>Commission Implementing Decision (EU) 2018/1147</i> for full BAT conclusion 7 table containing frequency and standards and the waste treatment processes they are to be monitored against.</p>	<p>As mentioned above, COD is monitored daily and entered into the Daily COD spreadsheet. Quarterly samples are collected from companies for effluent, pesticides, dust and sludge and sent to appropriate testing labs and the results used for EA annual returns.</p>
08	<p>BAT is to monitor channelled emissions to air with at least the frequency given below, and in accordance with EN standards. If EN standards are not available, BAT is to use ISO, national or other international standards that ensure the provision of data of an equivalent scientific quality.</p> <p>See section 1.2 of <i>Commission Implementing Decision (EU) 2018/1147</i> for full BAT conclusion 7 table containing frequency and</p>	<p>The site has an Odour Management Plan in place. The AD process will be fully contained.</p> <p>The existing CHP engine on site has a 34m stack, this provides adequate dispersion for any odours that could be present within the exhaust fumes. If CHPs are down or there is another failure on the plant affecting the process and the biogas pressure increases the operator has the option to flare biogas, if required, as a last resort to preserve the plant.</p>

Monitoring											
	standards and the waste treatment processes they are to be monitored against.	<p>Process records are maintained on the SCADA system and inspection, and maintenance of CHP engines take place as per manufacturers recommendations and recorded on the maintenance schedule.</p> <p>Greenhouse gas emissions are monitored by the new CHP unit through the CHPQA, which also monitors emissions from the boilers.</p>									
09	<p>BAT is to monitor diffuse emissions of organic compounds to air from the regeneration of spent solvents, the decontamination of equipment containing POPs with solvents, and the physico-chemical treatment of solvents for the recovery of their calorific value, at least once per year using one or a combination of the techniques given below.</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 5%;"></th> <th style="width: 20%;">Technique</th> <th style="width: 75%;">Description</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">a</td> <td>Measurement</td> <td>Sniffing methods, optical gas imaging, solar occultation flux or differential absorption. See descriptions in Section 6.2 of <i>Commission Implementing Decision (EU) 2018/1147</i>.</td> </tr> <tr> <td style="text-align: center;">b</td> <td>Emissions factors</td> <td>Calculation of emissions based on emissions factors, periodically validated (e.g. once every two years) by measurements.</td> </tr> </tbody> </table>		Technique	Description	a	Measurement	Sniffing methods, optical gas imaging, solar occultation flux or differential absorption. See descriptions in Section 6.2 of <i>Commission Implementing Decision (EU) 2018/1147</i> .	b	Emissions factors	Calculation of emissions based on emissions factors, periodically validated (e.g. once every two years) by measurements.	<p>These BAT techniques are not considered relevant as HSC do not process or have on site any solvents.</p>
	Technique	Description									
a	Measurement	Sniffing methods, optical gas imaging, solar occultation flux or differential absorption. See descriptions in Section 6.2 of <i>Commission Implementing Decision (EU) 2018/1147</i> .									
b	Emissions factors	Calculation of emissions based on emissions factors, periodically validated (e.g. once every two years) by measurements.									

Monitoring				
	c	Mass balance	Calculation of diffuse emissions using a mass balance considering the solvent input, channelled emissions to air, emissions to water, the solvent in the process output, and process (e.g. distillation) residues.	
10			<p>BAT is to periodically monitor odour emissions.</p> <p>Odour emissions can be monitored using:</p> <ul style="list-style-type: none"> – EN standards (e.g. dynamic olfactometry according to EN 13725 in order to determine the odour concentration or EN 16841-1 or -2 in order to determine the odour exposure); – when applying alternative methods for which no EN standards are available (e.g. estimation of odour impact), ISO, national or other international standards that ensure the provision of data of an equivalent scientific quality. <p>The monitoring frequency is determined in the odour management plan (see BAT 12).</p>	As detailed within the sites Odour Management Plan, the effectiveness of the control measures outlines are monitored daily using subjective odour monitoring (sniff test). This is carried out at the site boundary by a site operative upon first arrival at the site. Further sniff testing and observations are conducted around the various activities on site to identify potential odour risks and sources. Results of these assessments are recorded.
11			<p>BAT is to monitor the annual consumption of water, energy and raw materials as well as the annual generation of residues and wastewater, with a frequency of at least once per year.</p> <p>Monitoring includes direct measurements, calculation or recording, e.g. using suitable meters or invoices. The monitoring is broken down at the most appropriate level (e.g. at process or plant/installation level) and considers any significant changes in the plant/installation.</p>	HSC record their gas, electricity and water consumption daily. The data is recorded on a live spreadsheet which is updated daily. HSC are required, under the conditions of their environmental permit, to report their water, energy and point source emissions to sewer annually to the EA.

Emissions to air		
BAT Conclusion No	BAT Guidance (Adapted from Annex I of Directive 2010/75/EU)	Haworth Scouring Company Permit Documents
12	<p>In order to prevent or, where that is not practicable, to reduce odour emissions, BAT is to set up, implement and regularly review an odour management plan, as part of the environmental management system (see BAT 1), that includes all of the following elements:</p> <ul style="list-style-type: none"> – a protocol containing actions and timelines; – a protocol for conducting odour monitoring as set out in BAT 10; – a protocol for response to identified odour incidents, e.g. complaints; – an odour prevention and reduction programme designed to identify the source(s); to characterise the contributions of the sources; and to implement prevention and/or reduction measures. 	<p>HSC have an Odour Management Plan written in line with Environment Agency's Technical Guidance Note H4 standard. Aspects covered within the OMP include the following:</p> <ul style="list-style-type: none"> - Feedstock Inventory, including Odorous Materials Inventory; - Waste Acceptance Procedures; - Handling and Storage of Raw Materials; - Processing of Waste; - Odour Prevention Measures; - Handling and Storage of Digestate and Biogas; - Monitoring and Complaints Procedure; - Contingency Procedures for Abnormal Operating Conditions. - <p>The OMP provides an assessment of each potentially odorous material accepted by HSC on a regular basis, identifying the typical and abnormal compositions of those waste types and providing an overall odour potential of that feedstock based upon</p>

Emissions to air		
		the likelihood of abnormal compositions being encountered at site.
13	<p>In order to prevent or, where that is not practicable, to reduce odour emissions, BAT is to use one or a combination of the techniques given below.</p> <p>a) Minimising residence times – Minimising the residence time of (potentially) odorous waste in storage or in handling systems (e.g. pipes, tanks, containers), in particular under anaerobic conditions. When relevant, adequate provisions are made for the acceptance of seasonal peak volumes of waste.</p> <p>b) Using chemical treatment – Using chemicals to destroy or to reduce the formation of odorous compounds (e.g. to oxidise or to precipitate hydrogen sulphide).</p> <p>c) Optimising aerobic treatment - In the case of aerobic treatment of water-based liquid waste, it may include:</p> <ul style="list-style-type: none"> – use of pure oxygen; – removal of scum in tanks; – frequent maintenance of the aeration system. <p>In the case of aerobic treatment of waste other than water-based liquid waste, see BAT 36.</p>	<p>Due to the scale and nature of the operations conducted at site, technique B and C are not seen to be applicable. Physico-chemical treatment is used but this is to reduce COD and solids within the effluent.</p> <p>The maximum residence times of materials are well established and documented within site procedures i.e., wool-washing process effluent is held on site for a maximum of 7 days with a maximum quantity of 350 tonnes on site at any one time. Once the wool-washing process effluent has entered the digestion tanks, it will be held on site for a maximum of 3 days with a maximum quantity of 128 tonnes in each tank. HSC considers that a rapid anaerobic system with a retention time of 3 days offers a good compromise between the reduction of pollution potential of the effluent and the amount of tank storage required.</p> <p>No waste shall be stored outside of designated storage areas or the quantities stipulated in the OMP. Odour production during waste reception and preparation is minimised by processing the waste as soon as possible after it arrives on site to reduce the amount of waste stored, and to avoid the development of odorous conditions within the waste. In the event that storage capacity</p>

Emissions to air		
		<p>within the reception building is exceeded, then no more waste is accepted until the stockpiles are cleared.</p> <p>Liquid wastes are fed directly from the reception tanks into the digestion feeding line and at no point in this feeding process are liquid wastes exposed to the atmosphere.</p>
14	<p>In order to prevent or, where that is not practicable, to reduce diffuse emissions to air, in particular of dust, organic compounds and odour, BAT is to use an appropriate combination of the techniques given below. Depending on the risk posed by the waste in terms of diffuse emissions to air, BAT 14d is especially relevant.</p> <p>a) Minimising the number of potential diffuse emission sources – This includes techniques such as:</p> <ul style="list-style-type: none"> – appropriate design of piping layout (e.g. minimising pipe run length, reducing the number of flanges and valves, using welded fittings and pipes); – favouring the use of gravity transfer rather than using pumps; – limiting the drop height of material; – limiting traffic speed; – using wind barriers. <p>b) Selection and use of high-integrity equipment – This includes techniques such as:</p> <ul style="list-style-type: none"> – valves with double packing seals or equally efficient equipment; 	<p>As a responsible operator, HSC do employ preventative and reactive measures to fugitive emissions as indicated within their existing management system and Dust & Emissions Management Plan. Source strength is minimised by low drop heights, profiling and shielding of piles from wind shipping, and positioning of sources away from receptors as detailed within the Dust & Emissions Management Plan.</p> <p>The AD facility will be a technically advanced, bespoke anaerobic digestion plant built to a high-quality standard. The AD facility has minimal emission points as per its design.</p> <p>Plant/machinery is maintained in line with the manufacturer's recommendations and as per the requirements of the environmental permit system. Routine checks and required maintenance of plant and machinery is undertaken in accordance with the manufacturer's specification. A maintenance record is kept for each item of plant/machinery.</p>

Emissions to air	
<p>– high-integrity gaskets (such as spiral wound, ring joints) for critical applications;</p> <p>– pumps/compressors/agitators fitted with mechanical seals instead of packing;</p> <p>– magnetically driven pumps/compressors/agitators;</p> <p>– appropriate service hose access ports, piercing pliers, drill heads, e.g. when degassing WEEE containing VFCs and/or VHCs.</p> <p>c) Corrosion prevention – This includes techniques such as:</p> <p>– appropriate selection of construction materials;</p> <p>– lining or coating of equipment and painting of pipes with corrosion inhibitors.</p> <p>d) Containment, collection and treatment of diffuse emissions - This includes techniques such as:</p> <p>– storing, treating and handling waste and material that may generate diffuse emissions in enclosed buildings and/or enclosed equipment (e.g. conveyor belts);</p> <p>– maintaining the enclosed equipment or buildings under an adequate pressure;</p> <p>– collecting and directing the emissions to an appropriate abatement system (see Section 6.1) via an air extraction system and/or air suction systems close to the emission sources.</p> <p>e) Dampening - Dampening potential sources of diffuse dust emissions (e.g. waste storage, traffic areas, and open handling processes) with water or fog.</p> <p>f) Maintenance - This includes techniques such as:</p>	<p>The majority of the process is enclosed. The wool scouring takes place within a building and the AD process is fully sealed.</p> <p>It is considered that d) is not applicable to the Pressure Relief Valves (PRVs) for the following reasons:</p> <ul style="list-style-type: none"> • Digesters and biogas infrastructure are fully enclosed systems under normal operation; • PRVs remain sealed and do not contribute to diffuse emissions; • Pressure control is maintained through automated systems, ensuring gas remains within the closed system. <p>PRV discharges do not constitute diffuse emissions under BAT 14, as releases:</p> <ul style="list-style-type: none"> • Are not continuous • Are not inherent to normal operation • Occur only under abnormal or emergency conditions <p>Therefore, PRVs are outside the scope of routine BAT 14 diffuse emission control, but consistent with BAT 14’s objective of</p>

Emissions to air	
	<p>– ensuring access to potentially leaky equipment; – regularly controlling protective equipment such as lamellar curtains, fast-action doors.</p> <p>g) Cleaning of waste treatment and storage areas - This includes techniques such as regularly cleaning the whole waste treatment area (halls, traffic areas, storage areas, etc.), conveyor belts, equipment and containers.</p> <p>h) Leak Detection and Repair (LDAR) programme - See Section 6.2 of Commission Implementing Decision (EU) 2018/1147. When emissions of organic compounds are expected, a LDAR programme is set up and implemented using a risk-based approach, considering in particular the design of the plant and the amount and nature of the organic compounds concerned.</p>
	<p>emission minimisation through containment. Additionally, PRVs inspection and maintenance are noted within the LDAR Plan.</p> <p>Mud is removed from vehicles before leaving the site if required. Lorries are covered and loads are damped down before sheeting to prevent airborne dust if required. Roadways are maintained and kept clean to prevent dust or mud arising from vehicle movements.</p> <p>The site operates a strict maintenance regime and equipment used is of sufficient capacity to allow down time for routine maintenance and servicing as recommended by the manufacturer. Routine maintenance is recorded, and in addition operator pre-use checks will be completed to assess the general condition of the machines and identify any defects.</p> <p>Cleaning of the site is undertaken at a practical level by the operator. The site processes a comprehensive cleaning schedule which is overseen by the Plant Manager. The Plant Manager delegates tasks off this schedule to trained operatives to ensure the site is operating in line with permit requirements. The schedule contains a frequency for individual cleaning tasks as well as a sign off system when tasks are completed. The site is inspected daily so any housekeeping issues will be identified quickly and corrective action taken.</p>

Emissions to air		
		<p>The site has a comprehensive Leak Detection and Repair (LDAR) procedure in place.</p> <p>PRV alignment with BAT 14h:</p> <p>PRVs are sealed safety devices designed to prevent fugitive leakage during normal operation. Routine inspection and maintenance form part of the site's preventative maintenance schedule and LDAR plan.</p> <p>PRVs are not a source of uncontrolled fugitive emissions; rather, they are engineered emergency release points.</p> <p>Where PRVs activate:</p> <ul style="list-style-type: none">• The release is intentional, controlled, and safety-critical• The release is short-term and self-limiting <p>Accordingly, PRV emissions are not fugitive emissions as defined under BAT 14, but rather BAT-recognised abnormal emissions necessary for plant safety.</p>

Emissions to air		
15	<p>BAT is to use flaring only for safety reasons or for non-routine operating conditions (e.g. start-ups, shutdowns) by using both of the techniques given below.</p> <p>a) Correct plant design – this includes the provision of a gas recovery system with sufficient capacity and the use of high-integrity relief valves.</p> <p>b) Plant management – This includes balancing the gas system and using advanced process control.</p>	<p>In line with the requirements of this BAT conclusion and the requirements of the permit, the operator only uses the flare in an emergency scenario.</p> <p>The provision of adequately sized CHP units and flare for emergency operation prevents the venting of biogas during CHP downtime. The engines and flare are maintained as per manufacturers guidelines.</p> <p>The SCADA system allows the operator to continuously monitor gas pressure throughout the process. If certain parameters are met high level alarms activate warning the operator to take action to manage the high or low pressure.</p>
16	<p>In order to reduce emissions to air from flares when flaring is unavoidable, BAT is to use both of the techniques given below.</p> <p>a) Correct design of flaring devices – Optimisation of height and pressure, assistance by steam, air or gas, type of flare tips, etc., to enable smokeless and reliable operation and to ensure the efficient combustion of excess gases.</p> <p>b) Monitoring and recording as part of flare management - This includes continuous monitoring of the quantity of gas sent to flaring. It may include estimations of other parameters (e.g. composition of gas flow, heat content, ratio of assistance, velocity, purge gas flow rate, pollutant emissions (e.g. NO_x, CO, hydrocarbons), noise). The</p>	<p>The flare is set at a height at which the operator considers adequate for dispersion.</p> <p>The SCADA system allows the operator to continuously monitor gas pressure throughout the process and record any instances of flaring undertaken at the site.</p>

Emissions to air	
	recording of flaring events usually includes the duration and number of events and allows for the quantification of emissions and the potential prevention of future flaring events.

Noise and vibrations		
BAT Conclusion No	BAT Guidance (Adapted from Annex I of Directive 2010/75/EU)	Haworth Scouring Company Permit Documents
17	<p>In order to prevent or, where that is not practicable, to reduce noise and vibration emissions, BAT is to set up, implement and regularly review a noise and vibration management plan, as part of the environmental management system (see BAT 1), that includes all of the following elements:</p> <p>I. a protocol containing appropriate actions and timelines; II. a protocol for conducting noise and vibration monitoring; III. a protocol for response to identified noise and vibration events, e.g. complaints; IV. a noise and vibration reduction programme designed to identify the source(s), to measure/estimate noise and vibration exposure, to characterise the contributions of the sources and to implement prevention and/or reduction measures.</p>	<p>HSC have developed a Noise and Vibration Management Plan as part of their environmental management system. The plan is subject to an annual review in line with permit requirements. The document is written in line with Environment Agency's latest guidance. Aspects covered within the Noise and Vibration Management Plan include the following:</p> <ul style="list-style-type: none"> - Noise sources established on site; - Noise and vibration source mitigation assessment; - Description of sensitive receptors; - Noise complaints response, including the recording of the complaint, and the appropriate action taken to adequately respond to the complaint (if applicable); - Emergency response to noise; - Monitoring plan containing actions in the event elevated noise levels are detected.

Noise and vibrations		
18	<p>In order to prevent or, where that is not practicable, to reduce noise and vibration emissions, BAT is to use one or a combination of the techniques given below.</p> <p>a) Appropriate location of equipment and buildings - Noise levels can be reduced by increasing the distance between the emitter and the receiver, by using buildings as noise screens and by relocating building exits or entrances.</p> <p>b) Operational measures - This includes techniques such as:</p> <ul style="list-style-type: none"> (i) inspection and maintenance of equipment; (ii) closing of doors and windows of enclosed areas, if possible; (iii) equipment operation by experienced staff; (iv) avoidance of noisy activities at night, if possible; (v) provisions for noise control during maintenance, traffic, handling and treatment activities. <p>c) Low-noise equipment - This may include direct drive motors, compressors, pumps and flares.</p> <p>d) Noise and vibration control equipment - This includes techniques such as:</p> <ul style="list-style-type: none"> (i) noise reducers; (ii) acoustic and vibrational insulation of equipment; (iii) enclosure of noisy equipment; (iv) soundproofing of buildings. 	<p>A noise assessment was undertaken at the site in 2024 which concluded that none of the processes measured on the outdoor areas the site will result in the attendant employees being subjected to a daily personal exposure level (LEPd) in excess of either the Upper or Lower Exposure Action Levels (85 dB(A) and 80dB(A) respectively). The assessment supports the review that the facility is situated in the appropriate location and will be unlikely to give rise to noise related complaints from the closest sensitive receptors.</p> <p>As mentioned previously, the site operates a strict maintenance schedule, and all equipment is maintained in line with the manufacturer's recommendations. Equipment undergoes pre-use checks to ensure it is in good working order. Only appropriately trained and competent staff are allowed to operate site machinery.</p> <p>The majority of the process is enclosed.</p>

Noise and vibrations	
	e) Noise attenuation - Noise propagation can be reduced by inserting obstacles between emitters and receivers (e.g. protection walls, embankments and buildings).

Emissions to water		
BAT Conclusion No	BAT Guidance (Adapted from Annex I of Directive 2010/75/EU)	Haworth Scouring Company Permit Documents
19	<p>In order to optimise water consumption, to reduce the volume of wastewater generated and to prevent or, where that is not practicable, to reduce emissions to soil and water, BAT is to use an appropriate combination of the techniques given below.</p> <p>a) Water management – Water consumption is optimised by using measures which may include:</p> <ul style="list-style-type: none"> – water-saving plans (e.g. establishment of water efficiency objectives, flow diagrams and water mass balances); – optimising the use of washing water (e.g. dry cleaning instead of hosing down, using trigger control on all washing equipment); – reducing the use of water for vacuum generation (e.g. use of liquid ring pumps with high boiling point liquids). <p>b) Water recirculation – Water streams are recirculated within the plant, if necessary, after treatment. The degree of recirculation is limited by the water balance of the plant, the content of impurities</p>	<p>HSC record their water consumption daily and are actively working to reduce this. One of their environmental targets is to reduce energy and water consumption on site. The site has an energy management team that have procedures in place to low water usage.</p> <p>The facility, including the AD facility, is situated on a layer of impermeable surface with concrete access roads.</p> <p>A number of measures are employed to reduce the likelihood and impact of overflows from tanks and vessels. External tanks and associated pipework are sealed and sited on impermeable concrete bases within impermeable bunds, therefore any spills/leaks would be contained. The bunded areas are designed to hold a minimum of 25% of the total tankage, and 110% capacity</p>

Emissions to water	
<p>(e.g. odorous compounds) and/or the characteristics of the water streams (e.g. nutrient content).</p> <p>c) Impermeable surface – Depending on the risks posed by the waste in terms of soil and/or water contamination, the surface of the whole waste treatment area (e.g. waste reception, handling, storage, treatment and dispatch areas) is made impermeable to the liquids concerned.</p> <p>d) Techniques to reduce the likelihood and impact of overflows and failures from tanks and vessels – Depending on the risks posed by the liquids contained in tanks and vessels in terms of soil and/or water contamination, this includes techniques such as:</p> <ul style="list-style-type: none"> – overflow detectors; – overflow pipes that are directed to a contained drainage system (i.e. the relevant secondary containment or another vessel); – tanks for liquids that are located in a suitable secondary containment; the volume is normally sized to accommodate the loss of containment of the largest tank within the secondary containment; – isolation of tanks, vessels and secondary containment (e.g. closing of valves). <p>e) Roofing of waste storage and treatment areas – Depending on the risks posed by the waste in terms of soil and/or water contamination, waste is stored and treated in covered areas to prevent contact with rainwater and thus minimise the volume of contaminated run-off water.</p>	<p>of the largest tank. The AD tanks are also fitted with overflow detectors.</p> <p>Both the wool scouring and AD process take place in enclosed conditions, which limits the contact of any materials with rainwater.</p> <p>All surfaces on site are covered with an impermeable layer of concrete to allow for the transport of surface water to channels across the bunded area. The point at which the effluent plant discharges to the public sewer is adjacent to the effluent plant itself. Domestic foul water is discharged to the same sewer at a different point. There is a freshwater abstraction point along with chemical storage areas.</p> <p>Water collection on the ground of the site and from roofs and gutters is channelled to drains in the yards around the scour, warehouse and loading areas. These discharge partly direct to a stream that is culverted under the yard and partly into the public sewer. No process water is discharged to the stream, and no untreated effluent is discharged to the sewer under any circumstances.</p> <p>The site has an engineered fall which ensures that all rainwater is directed into a rainwater drainage channel which will be</p>

Emissions to water	
<p>f) Segregation of water streams – Each water stream (e.g. surface run-off water, process water) is collected and treated separately, based on the pollutant content and on the combination of treatment techniques. In particular, uncontaminated wastewater streams are segregated from wastewater streams that require treatment.</p> <p>g) Adequate drainage infrastructure – The waste treatment area is connected to drainage infrastructure. Rainwater falling on the treatment and storage areas is collected in the drainage infrastructure along with washing water, occasional spillages, etc. and, depending on the pollutant content, recirculated or sent for further treatment.</p> <p>h) Design and maintenance provisions to allow detection and repair of leaks - Regular monitoring for potential leakages is risk-based, and, when necessary, equipment is repaired. The use of underground components is minimised. When underground components are used and depending on the risks posed by the waste contained in those components in terms of soil and/or water contamination, secondary containment of underground components is put in place.</p> <p>i) Appropriate buffer storage capacity - Appropriate buffer storage capacity is provided for wastewater generated during other than normal operating conditions using a risk-based approach (e.g. taking into account the nature of the pollutants, the effects of downstream wastewater treatment, and the receiving environment).</p>	<p>integrated in the wall of the catastrophic failure retention bund that will surround the AD tanks. Collected rainwater is then captured within a rainwater sump for discharge to sewer or the site’s pump system for recirculation into process.</p> <p>Within the main bund that will surround the AD tanks, there will be two drainage channels: one that runs between the two rows of AD tanks, and one that runs alongside the site’s pump system. Captured liquid comprises process effluent, which is re-circulated back into the front of the process. Any solids that accumulate in the grit sump are dug out for subsequent disposal. In the event of a catastrophic failure, the grit sump will fill and activate a float switch which will cut power to the rainwater sump pump thereby preventing process liquid from being pumped out of the bund.</p> <p>The site has a comprehensive Leak Detection and Repair Plan in place.</p> <p>As part of the of the original permit application, the appropriate containment volume for the site was addressed in accordance with the relevant industry standards. It is understood that the site still possesses the required amount of buffer capacity to contain an event outside of normal operation.</p>

Emissions to water																										
	The discharge of wastewater from this buffer storage is only possible after appropriate measures are taken (e.g. monitor, treat, reuse).																									
20	In order to reduce emissions to water, BAT is to treat wastewater using an appropriate combination of the techniques given below.																									
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The site currently utilises physico-chemical treatment to treat wastewater, and the addition of the AD facility will mean that biological treatment will also be used. These techniques are being utilised to reduce the COD and solids within the effluent. HSC have deemed this combination of techniques appropriate following the conduction of research and trialling/testing. In their trials, HSC found that one advantage of this combination of techniques is reduced chemical usage, reduction in suspended and settled solids compared to physico-chemical treatment alone, and a reduction in the sludge produced.																										

Emissions to water			
	f.	Precipitation	Precipitable dissolved non-biodegradable or inhibitory pollutants, e.g. metals, phosphorus
	g.	Chemical oxidation	Oxidisable dissolved non-biodegradable or inhibitory pollutants, e.g. nitrite, cyanide
	h.	Chemical reduction	Reducible dissolved non-biodegradable or inhibitory pollutants, e.g. hexavalent chromium (Cr(VI))
	i.	Evaporation	Soluble contaminants
	j.	Ion exchange	Ionic dissolved non-biodegradable or inhibitory pollutants, e.g. metals
	k.	Stripping	Purgeable pollutants, e.g. hydrogen sulphide (H ₂ S), ammonia (NH ₃), some adsorbable organically bound halogens (AOX), hydrocarbons
	<i>Biological treatment, e.g.</i>		
	l.	Activated sludge process	Biodegradable organic compounds
	m.	Membrane bioreactor	
	<i>Nitrogen removal</i>		

Emissions to water			
	n.	Nitrification/denitrification when the treatment includes a biological treatment	Total nitrogen, ammonia
<i>Solids removal, e.g.</i>			
	o.	Coagulation and flocculation	Suspended solids and particulate-bound metals
	p.	Sedimentation	
	q.	Filtration (e.g., sand filtration, microfiltration, ultrafiltration)	
	r.	Flotation	
<p>In addition, see table 6.1 entitled 'BAT-associated emission levels (BAT-AELs) for direct discharges to a receiving water body' and table 6.2 entitled 'BAT-associated emission levels (BAT-AELs) for indirect discharges to a receiving water body' of <i>Commission Implementing Decision (EU) 2018/1147</i>. These tables contain the relevant BAT-EAL and substances/parameters which discharges to receiving water bodies should be tested for.</p>			

Emissions from accidents and incidents		
BAT Conclusion No	BAT Guidance (Adapted from Annex I of Directive 2010/75/EU)	Haworth Scouring Company Permit Documents
21	<p>In order to prevent or limit the environmental consequences of accidents and incidents, BAT is to use all of the techniques given below, as part of the accident management plan (see BAT 1).</p> <p>a) Protection measures – These include measures such as:</p> <ul style="list-style-type: none"> – protection of the plant against malevolent acts; – fire and explosion protection system, containing equipment for prevention, detection, and extinction; – accessibility and operability of relevant control equipment in emergency situations. <p>b) Management of incidental / accidental emissions – Procedures are established, and technical provisions are in place to manage (in terms of possible containment) emissions from accidents and incidents such as emissions from spillages, firefighting water, or safety valves.</p> <p>c) Incident / accident registration and assessment system - This includes techniques such as:</p> <ul style="list-style-type: none"> – a log/diary to record all accidents, incidents, changes to procedures and the findings of inspections; – procedures to identify, respond to and learn from such incidents and accidents. 	<p>HSC have an Accident Management Plan (AMP) developed as part of their permit management system. The document is written in line with Environment Agency’s SGN5.06.</p> <p>The AMP shall be regularly reviewed, within the context of an annual management review. The AMP encompasses the following requirements:</p> <ul style="list-style-type: none"> • Emergency contact details for the following: <ul style="list-style-type: none"> ○ Emergency services ○ Local Police ○ Environment Agency Hotline ○ Health and Safety Executive ○ Electricity Supplier ○ Local Authority ○ Out of Hours company contact. • An up-to-date assessment of the risks at site such as (not exhaustive): <ul style="list-style-type: none"> ○ Breach of site secondary containment; ○ Failure of site infrastructure; ○ Failure of mains services; ○ Accidental explosion of biogas/ fire; ○ Odour;

Emissions from accidents and incidents		
		<ul style="list-style-type: none"> ○ Impact of gas emissions leaving site; ○ Arson and/or vandalism and, ○ Spills. <p>Appropriate preventative and response measures are detailed and linked to wider site procedures.</p> <p>The Accident Management Plan and site emergency procedures describe the procedures to be followed in the event of potential environmental accidents or incidents that affect the wool scouring or anaerobic digestion process.</p> <p>Any accidents or incidents that occur on site, the known or suspected cause(s), and the actions taken are recorded by the Plant Manager on the daily check sheet and in the general accident record form.</p>

Material efficiency		
BAT Conclusion No	BAT Guidance (Adapted from Annex I of Directive 2010/75/EU)	Haworth Scouring Company Permit Documents

Material efficiency		
22	<p>In order to use materials efficiently, BAT is to substitute materials with waste.</p> <p><i>Description</i> Waste is used instead of other materials for the treatment of wastes (e.g. waste alkalis or waste acids are used for pH adjustment, fly ashes are used as binders).</p> <p><i>Applicability</i> Some applicability limitations derive from the risk of contamination posed by the presence of impurities (e.g. heavy metals, POPs, salts, pathogens) in the waste that substitutes other materials. Another limitation is the compatibility of the waste substituting other materials with the waste input (see BAT 2).</p>	<p>The opportunities for substituting materials with waste are quite limited, as the AD process needs to maintain optimum biological and chemical conditions in order to produce a quality digestate product as well as maintaining the condition of plant equipment.</p> <p>The feedstock for the AD process is the wastewater/process effluent from the scouring process which would otherwise be discharged straight to sewer.</p>

Energy efficiency		
BAT Conclusion No	BAT Guidance (Adapted from Annex I of Directive 2010/75/EU)	Haworth Scouring Company Permit Documents
23	<p>In order to use energy efficiently, BAT is to use both of the techniques given below.</p> <p>a) Energy efficiency plan - An energy efficiency plan entails defining and calculating the specific energy consumption of the activity (or activities), setting key performance indicators on an annual basis (for example, specific energy consumption expressed in kWh/tonne of</p>	<p>HSC monitors their energy consumption daily and are committed to reducing this. One of their environmental targets is to reduce their energy usage and increase the use of renewable sources of energy. The site's energy management team have procedures in place to lower their energy usage. HSC have set specific annual</p>

Energy efficiency		
	<p>waste processed) and planning periodic improvement targets and related actions. The plan is adapted to the specificities of the waste treatment in terms of process(es) carried out, waste stream(s) treated, etc.</p> <p>b) Energy balance record - An energy balance record provides a breakdown of the energy consumption and generation (including exportation) by the type of source (i.e. electricity, gas, conventional liquid fuels, conventional solid fuels, and waste). This includes:</p> <p>(i) information on energy consumption in terms of delivered energy; (ii) information on energy exported from the installation; (iii) energy flow information (e.g. Sankey diagrams or energy balances) showing how the energy is used throughout the process.</p> <p>The energy balance record is adapted to the specificities of the waste treatment in terms of process(es) carried out, waste stream(s) treated, etc.</p>	<p>energy consumption targets which they compare their consumption with. They are currently hitting their target.</p> <p>The biogas produced within the AD facility will be combusted within the CHP engine to produce electricity from renewable sources to displace electricity and gas currently used to power the site. Heat generated will provide hot water for the wool washing process.</p>
24	<p>In order to reduce the quantity of waste sent for disposal, BAT is to maximise the reuse of packaging, as part of the residues management plan (see BAT 1).</p> <p><i>Description</i> Packaging (drums, containers, IBCs, pallets, etc.) is reused for containing waste, when it is in good condition and sufficiently clean, depending on a compatibility check between the substances</p>	N/A as HSC do not operate a de-packaging line.

Energy efficiency		
	<p>contained (in consecutive uses). If necessary, packaging is sent for appropriate treatment prior to reuse (e.g. reconditioning, cleaning).</p> <p><i>Applicability</i> Some applicability restrictions derive from the risk of contamination of the waste posed by the reused packaging.</p>	

3.2 BAT Conclusions for the Biological Treatment of Waste

Overall environmental performance		
BAT Conclusion No	BAT Guidance (Adapted from Annex I of Directive 2010/75/EU)	Haworth Scouring Company Permit Documents
33	<p>In order to reduce odour emissions and to improve the overall environmental performance, BAT is to select the waste input.</p> <p><i>Description</i> The technique consists of carrying out the pre-acceptance, acceptance and sorting of the waste input (see BAT 2) so as to ensure the suitability of the waste input for the waste treatment, e.g. in terms of nutrient balance, moisture or toxic compounds which may reduce the biological activity.</p>	<p>The input to the AD process is the process effluent from the wool scouring process which is conferred into the pre-digestion effluent tank via sealed pipework. Process parameters will be carefully monitored at all times through the SCADA system.</p> <p>The composition of the process effluent is well characterised, and the site conducts daily sampling/monitoring to test COD and Turbidity. Yorkshire water also periodically take samples of the effluent for testing, and a laboratory analysis report is generated showing limits and readings. Quarterly samples are collected from companies for effluent, pesticides, dust, and sludge. These</p>

Overall environmental performance		
		<p>are sent to appropriate testing labs, and the results are used for the annual returns to the EA.</p> <p>HSC have also conducted AD trials on the effluent and found it to be successful in reducing COD and solids, highlighting the suitability of the input for the waste treatment.</p>

Emissions to air		
BAT Conclusion No	BAT Guidance (Adapted from Annex I of Directive 2010/75/EU)	Haworth Scouring Company Permit Documents
34	<p>In order to reduce channelled emissions to air of dust, organic compounds and odorous compounds, including H₂S and NH₃, BAT is to use one or a combination of the techniques given below.</p> <p>a) Adsorption- See Section 6.1 of <i>Commission Implementing Decision (EU) 2018/1147</i>.</p> <p>b) Biofilter- See Section 6.1 of <i>Commission Implementing Decision (EU) 2018/1147</i>. A pretreatment of the waste gas before the biofilter (e.g. with a water or acid scrubber) may be needed in the case of a high NH₃ content (e.g. 5-40 mg/Nm³) in order to control the media pH and to limit the formation of N₂O in the biofilter.</p> <p>Some other odorous compounds (e.g. mercaptans, H₂S) can cause acidification of the biofilter media and necessitate the use of a water</p>	<p>The collected biogas will undergo “scrubbing”; to remove contaminants using a carbon filter on the CHP’s gas intake line. Therefore, the facility is equipped with a form of channelling for their emissions to air of odorous compounds.</p> <p>Associated process controls are outlined within HSC’s Odour Management Plan.</p>

Emissions to air			
<p>or alkaline scrubber for pretreatment of the waste gas before the biofilter.</p> <p>c) Fabric filter- See Section 6.1 of <i>Commission Implementing Decision (EU) 2018/1147</i>. The fabric filter is used in the case of mechanical biological treatment of waste.</p> <p>d) Thermal oxidation- See Section 6.1 of <i>Commission Implementing Decision (EU) 2018/1147</i>.</p> <p>e) Wet scrubbing- See Section 6.1 of <i>Commission Implementing Decision (EU) 2018/1147</i>. Water, acid or alkaline scrubbers are used in combination with a biofilter, thermal oxidation or adsorption on activated carbon.</p> <p>For the BAT-associated emission levels (BAT-AELs) for channelled NH3, odour, dust and TVOC emissions to air from the biological treatment of waste see table 6.7 in Commission Implementing Decision (EU) 2018/1147. The contents of the table are displayed below for ease of reference.</p>			
Parameter	Unit	BAT-AEL (Average over the sampling period)	Waste treatment process
NH3(1)(2)	mg/Nm3	0,3-20	

Emissions to air				
	Odour concentration(1)(2)	ouE/Nm3	200-1 000	All biological treatments of waste
	Dust	mg/Nm3	2-5	Mechanical biological treatment of waste
	TVOC	mg/Nm3	5-40(3)	
<p>(1) Either the BAT-AEL for NH3 or the BAT-AEL for the odour concentration applies.</p> <p>(2) This BAT-AEL does not apply to the treatment of waste mainly composed of manure.</p> <p>(3) The lower end of the range can be achieved by using thermal oxidation.</p>				
The associated monitoring is given in BAT 8.				

Emissions to water and water usage		
BAT Conclusion No	BAT Guidance (Adapted from Annex I of Directive 2010/75/EU)	Haworth Scouring Company Permit Documents
35	<p>In order to reduce the generation of wastewater and to reduce water usage, BAT is to use all of the techniques given below.</p> <p>a) Segregation of water streams - Leachate seeping from compost piles and windrows is segregated from surface run-off water (see BAT 19f).</p> <p>b) Water recirculation - Recirculating process water streams (e.g. from dewatering of liquid digestate in anaerobic processes) or using</p>	<p>Techniques A and B are dealt with as part of BAT 19.</p> <p>The entire digestion process is contained and any liquid runoff from the waste is captured and added to the process. There is therefore minimal potential for the minimisation of leachate at an anaerobic digestion plant.</p>

Emissions to water and water usage		
	<p>as much as possible other water streams (e.g. water condensate, rinsing water, surface run-off water). The degree of recirculation is limited by the water balance of the plant, the content of impurities (e.g. heavy metals, salts, pathogens, odorous compounds) and/or the characteristics of the water streams (e.g. nutrient content).</p> <p>c) Minimisation of the generation of leachate - Optimising the moisture content of the waste in order to minimise the generation of leachate.</p>	

3.3 BAT Conclusions for the Anaerobic Treatment of Waste

Emissions to air		
BAT Conclusion No	BAT Guidance (Adapted from Annex I of Directive 2010/75/EU)	Haworth Scouring Company Permit Documents
38	<p>In order to reduce emissions to air and to improve the overall environmental performance, BAT is to monitor and/or control the key waste and process parameters.</p> <p><i>Description</i></p> <p>Implementation of a manual and/or automatic monitoring system to:</p> <ul style="list-style-type: none"> – ensure a stable digester operation; – minimise operational difficulties, such as foaming, which may lead to odour emissions; 	<p>HSC are able to maintain high levels of process control through the combination of various different operational procedures and monitoring of the central computer system (SCADA). The SCADA system provides continuous monitoring of the entire process, to ensure that process parameters are kept within the required critical limits. This continuous monitoring approach is complemented through manual checks made by HSC staff on a daily basis.</p>

Emissions to air		
	<p>– provide sufficient early warning of system failures which may lead to a loss of containment and explosions.</p> <p>This includes monitoring and/or control of key waste and process parameters, e.g.:</p> <ul style="list-style-type: none"> – pH and alkalinity of the digester feed; – digester operating temperature; – hydraulic and organic loading rates of the digester feed; – concentration of volatile fatty acids (VFA) and ammonia within the digester and digestate; – biogas quantity, composition (e.g. H₂S) and pressure; – liquid and foam levels in the digester. 	<p>The feeding of the primary fermenters is overseen and controlled by the Plant Manager/other Managers using the SCADA control system. Only the Plant Manager/other Managers and Managing Director have access to this control of feed rate, and the amount of feed is determined in line with loading rate calculations.</p>
52	<p>In order to improve the overall environmental performance, BAT is to monitor the waste input as part of the waste pre-acceptance and acceptance procedures</p> <p>Monitoring the waste input, e.g. in terms of:</p> <ul style="list-style-type: none"> • biodegradability (e.g. BOD, BOD to COD ratio, Zahn-Wellens test, biological inhibition potential (e.g. inhibition of activated sludge)); • feasibility of emulsion breaking, e.g. by means of laboratory-scale tests. 	<p>As the input to the AD process is to be the input wastewater that currently enters the effluent treatment system, these parameters are already accounted for and monitored for as part of the site's existing Environmental Permit. Therefore, it is considered that the site is compliant with this BAT Conclusion.</p>
53	<p>In order to reduce emissions of HCl, NH₃ and organic compounds to air, BAT is to apply BAT 14d and to use one or a combination of the techniques given below.</p>	<p>The AD treatment activity is fully sealed. Effluent is transferred from the effluent storage tank via sealed pipework to the digestors which are also sealed. Therefore, the AD process is considered outside the scope of BAT 53.</p>

Emissions to air			
	Technique		Description
	a.	Adsorption	See Section 6.6.1.
	b.	Biofilter	
	c.	Thermal Oxidation	
	d.	Wet Scrubbing	