This report addresses the BAT Conclusions for Waste Treatment with respect to BAT 1, 2, 3, 4, 5, 8, 10, 13, 14, 15, 16, 18, 19, 21, 23, 24, 33, 34, 35 and 38.

BAT 1

Technique	Description	How Biogen complies
In order to achieve the overall environmental performance, BAT is to implement and adhere to an Environmental Management System (EMS) that incorporates all of the following features:	• Commitment by management • Environmental Policy • Planning and procedures • Implementation of procedures • Checking performance and corrective actions • Reviews • Following the development of cleaner technologies • Plant decommissioning • Benchmarking • Waste stream management (see BAT 2 below) • An inventory of wastewater and waste gas streams (see BAT 3 below) • Residues Management Plan • Odour Management Plan • Noise Management Plan The scope and nature of the EMS will generally be related to the nature, scale and complexity of the installation, and the range of environmental impacts it may have.	An integrated Environmental Management System (Activ) is in place for all site operations and associated activities which identifies and minimises the risk of pollution so far as reasonably practicable. This includes, for example, but not limited to, accidents, incidents, non-conformances, site closure and managing complaints. An Environmental Policy has been incorporated into the Biogen's IMS which is reviewed annually by the company's CEO. Biogen have an internal auditing regime and are subject to an annual auditing schedule by an accredited third party for ISO9001 (Quality), ISO 14001 (Environment) and ISO45001 (Health & Safety). The key principles being based on achieving: • Risk-based thinking; • Continual improvement; • Process approach; • Evidence based decision making; • Relationship management; • Engagement of people; • Leadership; and • Customer focus. Other integrated policies include a Digestate Quality Policy, an Emergency Preparedness and Response procedure, and an Environmental Reporting Procedure for example.

		Multiple standalone site-specific documents that require approval by the regulator (as required) form part of the EMS and are subject to periodic reviews include, but not limited to: • Environmental Accident Management Plan • Fugitive Emissions Management Plan • Noise Management Plan • Odour Management Plan • Site Closure Plan. A copy of the environmental permit is available on 'Activ' and on a noticeboard within the site office. Biogen have an environmental policy which includes conducting periodic energy, water and raw material efficiency assessments and are continuously looking at means of reducing energy, water and raw material consumption. Biogen as an entity is accredited under the EU Skills Competence Management System. All Biogen employees must complete a minimum number of required training days each year to demonstrate and increase the level of ongoing continued competence. Biogen has a documented periodic monitoring and measurement schedule for emissions to air and water in accordance with the environmental permit for the site. Biogen's Environmental Policy includes an objective to continually review operational practices and technologies employed. Biogen are registered members of the Renewable Energy Association (REA). Biogen are consulted and asked to represent industry in forums and in sector meetings. Again, with this membership we are party to conferences, webinars, forums, etc,

		where technology providers exhibit with emerging technologies and alternatives. The company's shareholders are infrastructure asset private equity investors with a very forward-thinking approach, to this end, Biogen's Executive Team are frequently challenged on whether Biogen deploy the most effective technologies. The Executive Team are required to produce Board packs to include reviews of emerging technologies and an assessment as to their applicability to AD. Examples include, but are not limited to, alternative fuels for telehandlers and shovels, enhanced metal detection, improved separator technologies, digestate reduction etc. Furthermore, our shareholders ESG Manager is in regular dialogue with the Environment Manager and Acting Head of Compliance for ESG initiatives. This will be further enhanced by our registration to the carbon reduction scheme with Achilles, the UK's only Accredited Greenhouse Gas Certification Scheme. Since 2008, Achilles has delivered the Carbon Reduce Certification Scheme (Formerly known as CEMARS) under licence from Toitū Envirocare. The programme is accredited to ISO 14065 and ISO/IEC 17065. This will enable the company to measure, manage and report their Carbon Footprint with the utmost confidence and drive business efficiency through carbon reduction savings in operational cost and performance. Our Environmental Policy also includes an objective to adopt best practice wherever it is practical to do so. Emissions from site that can be assessed against sector-specific benchmarks such as CHP emissions testing, abatement testing and surface water runoff checks will be incorporated.

		Biogen will also assess its Compliance Band Rating and assess performance against other operators in the sector. Biogen has also registered to the carbon reduction programme aforementioned (Achilles, the UK's only Accredited Greenhouse Gas Certification Scheme). Since 2008, Achilles has delivered the Carbon Reduce Certification Scheme (Formerly known as CEMARS) under licence from Toitū Envirocare. The programme is accredited to ISO 14065 and ISO/IEC 17065.

BAT 2

Technique	Description	How Biogen complies
Set up and implement waste characterisation & pre-acceptance procedures	These procedures aim to ensure the technical (& 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 information provided by the previous waste holder(s).	Biogen has an established Feedstock Pre-acceptance Procedure (**document reference WWFPAP1**), which demonstrates how Biogen meets the BAT requirements and those in sections 2.1.2. of Sector Guidance Note IPPC S5.06. The pre-acceptance requires a three-stage sign-off by a representative from the Operations, Compliance and Laboratory/Research team. Samples are requested and analysed where appropriate on a risk basis. The procedure also details the need to obtain: • Information on the nature of the waste. • The composition and characterisation of the waste. • Handling requirements and associated hazards. • Where appropriate a representative sample of the waste will be taken from the customer and analysed ensuring the collected sample is representative providing justification for any deviations. The procedure is directly linked to the Feedstock Pre- Acceptance Form (**document reference WWFPAF1**) which is completed prior to any of the

		waste being accepted. The form, in addition to the above, also ensures the relevant information stated as part of the guidance is obtained: • Information and contact details for the current holder of the waste. • Description of the waste. • Description of the process giving rise to the waste. • Whether it is considered a high-risk feedstock, an example could be a liquid feedstock high in fat/oils or yeast which require careful management to preserve biology, or one where it is deemed a risk because of the nature in the way waste is collected. This requires additional sign-off at Director level. • The EWC/LOW code assigned to the waste. • The SIC code assigned to the producer of the waste. • The physical form the waste is in, e.g., solid, liquid, sludge. • Whether it contains Animal By-Products Regulations (ABPR) material, if yes, which category. • Whether it contains packaging, if yes, what type of packaging and estimated percentage. • The anticipated quantities of waste. • Waste testing (this is primarily for liquid-based feedstocks). Biogen undertake an extensive sampling program and work with an external laboratory to cover the following determinands: Total Solids % w/w, Organic Dry Matter % w/w, Total Nitrogen % w/w, Ammonium Nitrogen (mg/kg), Total Phosphorus (P) (mg/kg), Total Potassium (K) (mg/kg), Total Magnesium (Mg), Total Copper (Cu), Total Zinc (Zn), Total Sulphur (S), Total Molybdenum (Mo), Total Lead (Pb), Total Cadmium (Cd), Total Mercury (Hg), Total Nickel (Ni), Total Chromium (Cr), Total Sodium (Na), pH, Chloride, Fluoride, Total Arsenic (As), Total Selenium (Se), Water Soluble Sodium, CLS Fat Test (g / 100g), Microbial inhibition at pH 6.0, Microbial inhibition at pH 7.2, Microbial inhibition at pH 7.4, Microbial inhibition at pH 8.0, Biological Methane Production

		(LCH4/kg VS), Electricity Production (kWh/ AD tonne), COD (g/L). Routine samples are taken prior to acceptance and then either on a 6-monthly or 12-monthly basis, this is decided on a risk basis. Instances where there is cause of concern over variance, the research team will increase the frequency of testing for determinants of concern. Biogen have an agreed Feedstock Agreement; it stipulates that the customer must notify Biogen if there is a deviation from the feedstock described in their Agreement. This is a legally binding document that had input from legal advisors. It is signed by the customer. • Whether there are any special handling requirements with respect to H&S of personnel or in respect of the environment. • Any hazards associated with the waste. • Haulier details, including Waste Carriers Licence, ABPR approval where applicable. • The type of vehicle the waste will be transported in.
Set up and implement waste acceptance procedures	Acceptance procedures aim to confirm the characteristics of the waste, as identified in the pre-acceptance stage. 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 risk 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).	Biogen has a Delivery Offloading Procedure (document reference WWDOP1) , this includes a requirement for the weighbridge operator to confirm the load with the driver at the point of weigh-in and prior to tipping. Here they will also check the EWC/LOW code, and the Waste Transfer Notes (WTN)/Duty of Care (DOC) paperwork and ensure they are booked in on the pre-agreed Commercial schedule. The initial sampling is undertaken prior to waste acceptance due to the turnaround times; however periodic sampling thereafter is coordinated by Biogen's Research Team. When waste is tipped the load is visually inspected for any non-conforming items, and material is again visually assessed for any obvious contamination prior to loading into the hoppers. In the event contamination is identified, it is quarantined to one side, and photographs are taken and the relevant persons notified as per the Contaminated Feedstock Procedure (**document reference WWCFP1**). The site team are

		familiar with the waste acceptance criteria for the site and the need to report deviation from this. Likewise, the team will raise any other hazards resulting from waste streams that could impact on process safety, occupational safety or the environment. Biogen undertake frequent occupational and environmental monitoring, the frequency of which may be reviewed if necessary following feedback on feedstocks. Contamination tends to be objects which could cause mechanical damage to front end processing equipment as opposed to hazardous waste materials. However, to ensure this does not pose a risk, training is also provided to employees on hazardous waste, and this is also covered under the Disposal of Hazardous Waste Procedure.
Set up & implement a 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 holder(s), pre-acceptance and 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 risk 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).	Biogen's Integrated Management System (IMS) utilises an electronic management software system (Activ) that stores all data relating to pre-waste acceptance (as described in detail above, including but not limited to ongoing analysis results). This same management system captures any issues with loads and the action taken via the "incident log" module. In addition to the electronic IMS, our weighbridge software captures all input and outputs to the site. This is done in accordance with the Wastemetrics Work Instruction for Weighbridge Staff, which also highlights where a load can be marked as "rejected". Biogen's monitoring of incoming waste with unique customer references, dates, time of arrival, tank level monitoring, digestate outloads, etc allow for accurate monitoring of tank volumes. However, as the process operates on a continuous flow process it is not possible to definitively pinpoint the exact location (albeit with the knowledge of retention times at each stage it is possible to give an indication), this differs to a batch process that allows full identification at each stage. However, on a risk basis, we take low risk material (i.e. food waste that was intended for consumption), and where liquid feedstocks are involved, we apply customer site visits/audits and sample analysis.

Ensure waste segregation	Waste is kept separated depending on its properties in order to enable easier and environmentally safer storage and treatment. Waste segregation relies on the physical separation of waste on procedures that identify when and where wastes are stored.	The Westwood AD facility will continue to accept predominantly source segregated food waste that was intended for consumption. To achieve the optimum biological conditions, Biogen agitate the contents of the Raw Waste Buffer Tank (RWBT) to ensure a homogenous mix. The waste pre-acceptance process would rule out any incoming material that couldn't be mixed at the waste acceptance stage or in the RWBT, or at the very least, would identify maximum volumes that could be accepted at any one time/over a period. Biogen have an established Research Team who form part of the pre-waste acceptance team and provide feedback and advice on new feedstocks and process monitoring. Segregation in the Westwood process therefore generally relates to the different stages of treatment where control measures are in place to ensure partially treated material cannot come into contact with fully treated material. This is controlled through engineering, including both software control and hardwired controls as part of our HAZOP process. An example of a procedure that covers these controls is the Pasteuriser Fill Discharge Procedure, the HACCP Plan, and Process Flow and Hazard Identification for HACCP Production.
Ensure waste compatibility prior to mixing or blending of waste	Compatibility is ensured by a set of verification measures and tests in order to detect any unwanted and/or potentially dangerous chemical reactions between wastes (e.g., polymerisation, gas evolution, exothermal reaction, decomposition, crystallisation, precipitation) when mixing, blending, or carrying out other treatment operations. The compatibility tests are risk-based considering, for example, the hazardous properties of the waste, the risk posed by the waste in terms of process safety, occupational safety and environmental	As described above, waste streams are materials which can be readily mixed to form a homogenous mix. To avoid undesirable wastes, a comprehensive pre-waste acceptance process is followed, and materials considered "higher risk" are analysed prior to acceptance. Furthermore, to assess impact on biology, trial loads may be taken to allow for a fuller assessment of the characteristics. Hazardous materials are not accepted, and even with organic feedstocks great care is taken when introducing new feedstocks.

	impact, as well as the information provided by the previous waste holder(s).	
Sort incoming solid waste	Sorting of incoming solid waste aims to prevent unwanted material from entering subsequent waste treatment process(es). It may include: -manual separation by means of visual examinations; -ferrous metals, non-ferrous metals or all metals-separation; -optical separation, e.g. by near infrared spectroscopy or x-ray systems; -density separation, e.g. by air classification, sink-float tanks, vibration tables; -size separation by screening/sieving	Currently the sorting relies on visual inspection to identify unwanted materials from entering the process. Biogen has undertaken trials on another of its AD facilities in respect of metal detectors, and as a result of these trials there may be some modifications to enhance this in the future.

BAT 3 – 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.

Characteristics of the Wastewater Streams

Information about the characteristics of the wastewater streams, such as:	**How Biogen complies**
Average values and variability of flow, pH, temperature & conductivity Average concentration & load values of relevant substances and their variability (e.g. DOD/TOC, nitrogen species, phosphorous, metals, priority substances/micropollutants) Data on bio eliminability (e.g. BOD, BOD to COD ratio, Zahn-Wellens test, biological inhibition potential (e.g. inhibition of activated sludge))	The applicability of this BAT is limited in scope when applied to Westwood due to the nature of the wastes handled and the design incorporating a sealed drainage system. As detailed above, Biogen have pre-acceptance testing for certain waste feedstocks (this is primarily for liquid-based feedstocks). Biogen undertake an extensive sampling program and work with an external laboratory to cover the following determinands: Total Solids % w/w, Organic Dry Matter % w/w, Total Nitrogen % w/w, Ammonium Nitrogen (mg/kg), Total Phosphorus (P) (mg/kg), Total Potassium (K) (mg/kg), Total Magnesium (Mg), Total Copper (Cu), Total Zinc (Zn), Total Sulphur

	(S), Total Molybdenum (Mo), Total Lead (Pb), Total Cadmium (Cd), Total Mercury (Hg), Total Nickel (Ni), Total Chromium (Cr), Total Sodium (Na), pH, Chloride, Fluoride, Total Arsenic (As), Total Selenium (Se), Water Soluble Sodium, CLS Fat Test (g / 100g), Microbial inhibition at pH 6.0, Microbial inhibition at pH 7.2, Microbial inhibition at pH 7.4, Microbial inhibition at pH 8.0, Biological Methane Production (LCH4/kg VS), Electricity Production (kWh/ AD tonne), COD (g/L). In respect of wastewater, the Westwood AD facility is designed with a sealed drainage system. All leachates or liquors derived from incoming feedstocks are captured in the sealed drainage system within the waste reception building. The impermeable surfacing within the building is engineered to drain away from the shutter doors and towards the below ground pit which is then directed into the process for full treatment. This ultimately then forms their final digestate which meets full PAS 110 compliance and is not classified as waste but instead is recognised as a product for agricultural benefit. The same is also true of any condensates produced in the treatment process, these are fed back into the process to undergo full treatment and form our end PAS 110 product. Rainwater captured within the secondary containment area is either put through the treatment process or to be discharged to the onsite surface water attenuation pond subject to ammonia testing and visual assessment. Total water returned to process is recorded daily on the Plant Monitoring Spreadsheet. The volume of water discharged to the pond from the Water Storage Tank is recorded via a flow meter following a visual inspection and ammonia test. A penstock remains closed which is manually controlled to manage water levels within the attenuation pond to allow the release of water from the pond to a drainage ditch supported by reedbeds under controlled conditions. Clean uncontaminated surface water from roofs, or from areas of the site not being directly used for waste management activities is kept isolated and discharged directly to the onsite attenuation pond.

Characteristics of the waste gas streams

Information about the characteristics of the waste gas streams, such as:	**How Biogen complies**
Average values and variability of flow and temperature Average concentration and load values of relevant substances and their variability (e.g., organic compounds, POPs such as PCBs) Flammability, lower and higher explosive limits, reactivity Presence of other substances that may affect the waste gas treatment system or plant safety (e.g. oxygen, nitrogen, water vapour, dust).	The applicability of this BAT is limited in scope when applied to Westwood due to the nature of the wastes handled and the design incorporating minimal release points. The Biogen AD process is very simplistic in terms of emission points due to its sealed nature. The RWBT, Digesters 1 and 2, and both Pasteurisers are connected to the common gas line to feed the site's CHP engines. Digesters 3, 4 and 5 provide gas pending upgrade and export to the National Grid. The CHP engines are subject to annual MCerts emissions testing. Two new gas boilers utilise gas from Digesters 1 and 2 to provide heat for Digesters 3, 4 and 5. The waste reception hall is to be served by a new purpose designed carbon filtration system allowing treated air to be dispersed through a new emission stack. A new replacement ventilation and extraction system will be installed within the building to maintain a healthy working environment. This will provide a minimum of three air changes per hour. The existing extraction system provides a minimum of three air changes per hour, and the carbon filter emissions are tested twice yearly in accordance with the permit. The new purpose designed extraction system and carbon filtration system will provide a minimum of three air changes per hour and emissions from the carbon filter will be compliant with the ELVs specified in the permit and in accordance with BAT. Air from a new purpose-built sealed screening room with a separator will be extracted and channelled through to an acid scrubber for treatment prior to emission to air. The screening room will be subject to a minimum of ten air changes

	per hour. This new abatement system will be compliant with BAT. Emissions testing will be completed twice yearly, and emission limits will be compliant with the ELVs specified in the permit and in accordance with BAT. There is currently no extraction or odour abatement system in place for the screening of digestate on site. Screening currently takes place out in the open within the secondary containment area. This will be a significant operational and environmental improvement. The Odour Abatement Maintenance Procedure (**document reference WWOAMP1**) states the parameters routinely tested which include, but not limited to, flow, temperature, and pH. This will be subject to periodic VOC/GCMS analysis, however the variability in the feedstock is limited and the cost and time to sample is high, therefore this will not be done as frequently as olfactory, but instead will be done if concerns are present on abatement performance. Due to the nature of the feedstocks and the wet AD process, dust is low risk in our process. Pre-acceptance also considers dusty feedstock, if dusty feedstocks were to be accepted going forward, independent occupational and environmental dust monitoring would be commissioned as required, it is the responsibility of the Compliance Team to commission additional testing as required. Olfactory, H_2S and NH_3 testing will continue to be completed every six months. In respect of flammability, UEL and LELs, the company has appointed specialist consultants to conduct DSEAR reviews and risk assessments, and they consider all aspects of the site's operations in these reviews. Full DSEAR assessments take place under a Control of Change procedure in advance of any infrastructure changes.

BAT 4 – In order to reduce the environmental risk associated with the storage of waste, BAT is to use all of the techniques given below.

Technique		Description	Applicability	How Biogen complies
a.	Optimised storage location	This includes techniques such as:	Generally applicable to new plants	The storage of waste within the waste reception hall is stored in an enclosed purpose designed building served by

		• The storage is located as far as technically and economically possible from sensitive receptors, watercourses etc.. • The storage is in such a way so as to eliminate or minimise the unnecessary handling of wastes within the plant		a new replacement negative air extraction system. This system is designed to provide a minimum of three air changes per hour. Extracted air from the reception and processing building will be channelled through to a new replacement carbon filtration system for treatment prior to release to atmosphere via a new emission stack to aid dispersion. The existing extraction system provides a minimum of three air changes per hour, and the carbon filter emissions are tested twice yearly in accordance with the permit. The new purpose designed extraction system and carbon filtration system will provide a minimum of three air changes per hour and emissions from the carbon filter will be compliant with the ELVs specified in the permit and in accordance with BAT. This upgrade will provide significant operational and environmental improvements. Solid wastes are stored within the reception bays prior to pre-treatment in preparation for digestion. Incoming vehicles delivering feedstocks reverse into the sealed building and tip within the bays as overseen by site foreman following the closure of the fast-acting automated shutter doors. Once tipped and ready for departure, the shutter doors are opened pending the vehicle exiting. The shutter doors are currently serviced annually by an independent door specialist. This will continue under the proposed variation, and the doors will be subject to a complete overhaul and full service prior to permit variation approval. The nearest enclosed surface water body is an onsite attenuation (balancing) pond which is engineered to accept uncontaminated and treated site surface water.

				Treated rainwater from within the secondary containment area will be discharged to the attenuation pond following a recorded visual inspection and ammonia test. A penstock remains closed unless released to control water levels within the pond to allow the release of water from the pond to a drainage ditch supported by reedbeds under controlled conditions. The Westwood AD facility is located in a rural setting approximately 3 km from Rushden. The nearest residential receptor is located approximately 600 metres from the site boundary. An existing reception hall layout plan shows the location of the feedstock storage bays and quarantine area for non-conforming wastes (**document reference WWSLP1**).
b.	Adequate storage capacity	Measures are taken to avoid accumulation of waste, such as: • The maximum waste storage capacity is clearly established and not exceeded taking into account the characteristics of the wastes (e.g. regarding the risk of fire) and the treatment capacity	Generally applicable	The Westwood AD facility accepts predominantly source segregated food waste that was intended for consumption. To achieve the optimum biological conditions, Biogen agitate the contents of the Raw Waste Buffer Tank (RWBT) to ensure a homogenous mix. The waste pre-acceptance process would rule out any incoming material that couldn't be mixed at the waste acceptance stage or in the RWBT, or at the very least, would identify maximum volumes that could be accepted at any one time/over a period. Biogen have an established Research Team who form part of the pre-waste acceptance team and provide feedback and advice on new feedstocks and process monitoring.

		• The quantity of waste stored is regularly monitored against the maximum allowed storage capacity • The maximum residence time of waste is clearly established		The pre-acceptance requires a three-stage sign-off by a representative from the Operations, Compliance and Laboratory/Research team. Samples are requested and analysed where appropriate on a risk basis. The procedure also details the need to obtain: • Information on the nature of the waste. • The composition and characterisation of the waste. • Handling requirements and associated hazards. • Where appropriate a representative sample of the waste will be taken from the customer and analysed ensuring the collected sample is representative providing justification for any deviations. The AD process operates on a continuous flow process and with Biogen's strict pre-acceptance waste procedures in place, the maximum storage capacity for feedstock within reception will not be exceeded. In the unlikely event further, feedstocks cannot be accepted on site, Biogen would divert feedstocks elsewhere to other AD plants within the company with the closest sites being Twinwoods (7 miles) and Bygrave (34 miles). Westwood operates as a wet AD process. Due to the nature of the feedstocks and the wet nature of the process, the fire risk associated with the waste is negligible. Section 3 of the Fire Prevention Plan guidance (updated 11 January 2021) states that biowaste treatment (wet anaerobic digestion) does not apply.

c.	Safe storage operation	This includes measures such as: • 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	Generally applicable	Checks on equipment used for loading, unloading and storing waste are incorporated into the Daily Check Procedure. A procedure for Contingency arrangements for equipment or system failure is in place. This provides guidance on contingency in the event of system or equipment failure through part of the AD process or an incident/accident which could affect digestate quality. As stated above, Biogen have a strict Feedstock Pre-Acceptance Procedure (**document reference WWFPAP1**) which is completed prior to any of the waste being accepted. This includes, but not limited to: • a full description of the waste; • a description of the process giving rise to the waste; • whether it is considered a high-risk feedstock, an example could be a liquid feedstock high in fat/oils or yeast which require careful management to preserve biology, or one where it is deemed a risk because of the nature in the way waste is collected. This requires additional sign-off at Director level. • The SIC code assigned to the producer of the waste. • The physical form the waste is in, e.g. solid, liquid, sludge. • Whether it contains Animal By-Products Regulations (ABPR) material, if yes, which category.

				• Whether it contains packaging, if yes, what type of packaging and estimated percentage. • The anticipated quantities of waste. • Waste testing (this is primarily for liquid-based feedstocks). • Whether there are any special handling requirements with respect to H&S of personnel or in respect of the environment. Any hazards associated with the waste. • The type of vehicle the waste will be transported in. When waste is tipped the load is visually inspected for any non-conforming items, and material is again visually assessed for any obvious contamination prior to loading into the hoppers. Contamination tends to be objects which could cause mechanical damage to front end processing equipment as opposed to hazardous waste materials. However, to ensure this does not pose a risk, training is also provided to employees on hazardous waste, and this is also covered under the Disposal of Hazardous Waste Procedure. All containers and drums are fit for purpose and stored securely. Where applicable, all secondary containment is provided with a minimum of 110% of the container's maximum storage capacity for a single container or where there is more than one container, not less than 110% of the largest container or 25% of the total capacities, whichever is greater.

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.	Generally applicable	Hazardous wastes are not accepted on site.

BAT 5 – In order to reduce the environmental risk associated with the handling and transfer of waste, BAT is to set up and implement handling and transfer procedures.

Description	How Biogen complies
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: • 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). Handling and transfer procedures are risk-based considering the likelihood of accidents and their environmental impact.	As previously stated, Biogen has an established Feedstock Pre-acceptance Procedure, which demonstrates how Biogen meets the BAT requirements and those in sections 2.1.2. of Sector Guidance Note IPPC S5.06. The pre-acceptance requires a three-stage sign-off by a representative from the Operations, Compliance and Laboratory/Research team. Samples are requested and analysed where appropriate on a risk basis. The procedure also details the need to obtain: • Information on the nature of the waste; • The composition and characterisation of the waste; • Handling requirements and associated hazards; and • Where appropriate, a representative sample of the waste will be taken from the customer and analysed ensuring the collected sample is representative providing justification for any deviations. The procedure is directly linked to the Feedstock Pre- Acceptance Form (**Document reference WWFPAF1**) which is completed prior to any of the waste being accepted. The form, in addition to the above, also ensures the relevant information stated as part of the guidance is obtained including: • Information and contact details for the current holder of the waste. • Description of the waste. • Description of the process giving rise to the waste.

	• Whether it is considered a high-risk feedstock, an example could be a liquid feedstock high in fat/oils or yeast which require careful management to preserve biology, or one where it is deemed a risk because of the nature in the way waste is collected. This requires additional sign-off at Director level. • The EWC/LOW code assigned to the waste. • The SIC code assigned to the producer of the waste. • The physical form the waste is in, e.g. solid, liquid, sludge. • Whether it contains Animal By-Products Regulations (ABPR) material, if yes, which category. • Whether it contains packaging, if yes, what type of packaging and estimated percentage. • The anticipated quantities of waste. • Waste testing (this is primarily for liquid-based feedstocks). • Whether there are any special handling requirements with respect to H&S of personnel or in respect of the environment. Any hazards associated with the waste. • Haulier details, including Waste Carriers Licence, ABPR approval where applicable. • The type of vehicle the waste will be transported in. When waste is tipped the load is visually inspected for any non-conforming items, and material is again visually assessed for any obvious contamination prior to loading into the hoppers. In the event contamination is identified, it is quarantined to one side and photographs are taken and the relevant persons notified as per the Contaminated Feedstock Procedure (**Document refence WWCFP1**). As described above, the waste sourced can be readily mixed to form a homogenous mix. To avoid undesirable wastes, a comprehensive pre-waste acceptance process is followed, and materials considered “higher-risk” are analysed prior to acceptance. Furthermore, to assess impact on biology, trial loads may be taken to allow for a fuller assessment of the characteristics. In respect of wastewater, the Westwood AD facility is designed with a sealed drainage system. All leachates from the incoming waste feedstocks within the building are captured in a

	purpose designed sealed drainage system. The reinforced impermeable surfacing is designed and engineered to drain to a below ground pit and away from the doors which are then contained and then directed into the process for full treatment. The waste reception hall concrete floor has already been resurfaced as part of this permit variation application. Due to the nature of the feedstocks and the wet nature of the process, dust is low risk in our process. Pre-acceptance also considers dusty feedstock, if dusty feedstocks were to be accepted going forward, independent occupational and environmental dust monitoring would be commissioned as required, it is the responsibility of the Compliance Team to commission additional testing as required.

BAT 8 – BAT is to monitor channelled emissions to air with at least the frequency given below, and in accordance with EN standards…..

Substance/parameter	Standard(s)	Waste Treatment Process	Minimum Monitoring frequency	Monitoring associated with….	How Biogen complies…..
H_2S	No EN Standard available as documented in the Official Journal of the European Union BAT Conclusions.	Biological treatment of waste	6-monthly	BAT 34	Biogen uses an appointed MCerts accredited laboratory for testing.

					Biogen will continue to utilise the gas detection tubes to provide an instant result. There are no specified ELV's in the permit for H_2S. A schedule to allow for 6-monthly testing is in place with an MCerts accredited laboratory for Biogen's national network of AD plants.
NH_3	No EN Standard available as documented in the Official Journal of the European Union BAT Conclusions.	Biological treatment of waste	6-monthly	BAT 34	Biogen uses an appointed MCerts accredited laboratory to do the testing. Biogen will continue to utilise gas detection tubes to provide an instant result. A schedule to allow for 6-monthly testing is in place with an MCerts laboratory for Biogen's national network of AD plants.

Odour concentration	EN 13725	Biological treatment of waste	6-monthly	BAT 34	**BAT 34** stipulates that either BAT-AEL for NH_3 or the BAT-AEL for the odour concentration applies. Likewise, **BAT 8** stipulates that the monitoring of NH_3 and H_2S can be used as an alternative to the monitoring of the odour concentration or vice versa.

BAT 10 – BAT is to periodically monitor odour emissions.

Description	Applicability	How Biogen complies
Odour emissions can be monitored by using: • EN standards • When applying alternative methods for which no EN standards are available, ISO, national or other international standards that ensures the provision of data of an equivalent scientific quality. The monitoring frequency is determined in the Odour Management Plan.	The applicability is restricted to cases where an odour nuisance at sensitive receptors is expected and/or has been substantiated.	Only 4 odour complaints were received for Westwood in 2025, 1 of which was directly associated with nearby land spreading activities and not site operations. A total of 4 odour complaints were received in 2024, 2 of which were associated with land spreading activities. A total of 5 odour complaints were received in 2023. All odour complaints were regarded as minor category 3 incidents. The site is to have a new replacement purpose designed carbon filtration odour abatement system to treat extracted channelled air from the waste reception and processing building as part of this permit variation. The extraction and abatement system will be installed and maintained in accordance with BAT and subject to twice yearly emissions testing to ensure all emissions are compliant with the ELVs specified in the permit and in accordance with BAT. A new purpose designed acid scrubber will be installed to treat extracted channelled air from a new sealed purpose-built screening room as part of this permit variation. This will be installed and operated in accordance with BAT and subject to twice yearly emissions testing in accordance with the emission limits specified in the permit and compliant with BAT. Site boundary odour checks are carried out daily by relevant staff and recorded on a Daily Check Sheet and on Limble. Biogen has been collaborating with third party odour abatement specialists to carry out improvement works as part of this variation application. This includes, but not limited to, replacing the current air extraction ducting, air flow testing within the reception building, replacing the carbon media and filtration system and

		reconfiguring/replacing the emission stack. This involves demonstrating adequate incoming fresh air and extraction rates to maintain the minimum required 3 air changes per hour. Point source extraction will be installed/replaced above the predominant odour sources within the building as part of this variation application. The abatement system has been finalised pending installation. This is the same for the new acid scrubber to treat extracted channelled air from the separator room. Monitoring parameters listed in the permit include NH_3, H_2S and odour concentration. However, BAT 34 stipulates that either the BAT-AEL for NH_3 or the BAT-AEL for odour concentration applies. Likewise, BAT 8 stipulates that the monitoring of NH_3 and H_2S can be used as an alternative to the monitoring of odour concentration, or vice versa. Biogen uses an MCerts accredited laboratory to do the emissions testing analysis to the required standards. Biogen will continue to utilise the gas detection tubes which provide an instant result. They also minimise the environmental and health & safety aspects of using acid solutions. The latest testing took place at Westwood on 18th September 2025 for H_2S, NH_3 and odour concentration.

BAT 13 – 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.

Technique	Description	Applicability	How Biogen complies

a.	Minimising residence time	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.	Only applicable to open systems	All of Biogen's AD sites including Westwood operate on a continuous process system. Therefore, the temporary storage of feedstock within the waste reception and processing building is for a minimum period and for no longer than 48 hours. In the unlikely event of significant plant or equipment malfunction preventing feedstocks from being processed on site, feedstocks would be diverted elsewhere to one of Biogen's alternative AD sites. The closest sites being Twinwoods (8 miles) and Bygrave (34 miles). This includes during essential planned maintenance including de-gritting works and CHP third party servicing for example. All feedstocks are received on site in an enclosed building operating under negative air extraction. This ventilation and extraction system will be replaced as part of this permit variation in accordance with BAT. Evidence of installation will be provided to the Environment Agency on completion. The fast-acting roller shutter doors are fully closed prior to tipping and not reopened until the vehicle is ready to leave following tipping. The new air extraction system is designed to achieve a minimum of 3 air changes per hour. This maintains a healthy working environment for staff and visitors and ensures odorous air is retained within the building to prevent fugitive emissions. The extraction fans are purpose designed and engineered to provide sufficient extraction in accordance with the design capacity of the building.

				Should the seal and integrity of the building ever be questioned, a physical or virtual smoke test would be repeated to demonstrate the integrity of the building and the minimum number of required air changes. Extracted air from the waste reception and processing building is directed through to carbon filter. This will be replaced with a new purpose designed carbon filtration system for treatment and be in accordance with BAT. Treated air will be exhausted through a new emissions stack to aid with dispersion. Air from the new purposed built sealed screening room with 2 separators is to be extracted through to a new acid scrubber for treatment. The screening room will be subject to a minimum of ten air changes per hour. The acid scrubber is predominantly designed to target and reduce ammonia, hydrogen sulphide, VOCs and other liquid soluble compounds. There is currently no odour control or abatement in place for the screening of digestate as this currently takes place outside in the open. This will be a significant improvement as part of the permit variation. No waste is allowed to be stored outside. In order to minimise the number of potential diffuse emissions sources, the site layout has been designed and engineered with the intention of minimising pipe run lengths (where possible). Most of the existing pipework is above ground stainless steel with welded fittings and pipes. Minimal piping is currently positioned below ground and under the ongoing

				modernisation of the plant as part of this variation, new and replacement pipework will continue to be above ground stainless steel and any pipework below ground is to be minimised further. Once processed into the RWBT, the material enters a sealed system of gas tight tanks and enclosed pipework, the integrity of the pipework and tanks on site is checked daily in accordance with the Daily Checks Procedure**.** There is very low potential for odour from this part of the process. Quarterly Ultrasonic Thickness Testing as a form of Non-Destructive Testing (NDT) takes place for all pipework and tank infrastructure to monitor any reduction thickness over time. Any reduction in thickness would be recorded and necessary proactive remedial actions taken. In addition to this, Biogen has purchased a Opgal Eyecsite gas detection camera at considerable cost and members of the Biogen compliance team are trained to use the camera to assist with the LDAR programme across the business. Where a methane leak is detected, corrective actions will be put in place. By having our own gas detection camera, we are in a position to not only fulfil the six monthly LDAR requirement, but to also address any potential concerns around methane slippage which can be investigated and resolved. Biogen has an appointed Technical Compliance Manager who oversees the LDAR schedule and monitoring schedule.

				A full LDAR survey is conducted every six months and includes, but not limited to, all process and storage tanks, PRVs, CHP engines, gas holders, flares, Gas to grid infrastructure and pipework.
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)	Not applicable if it may hamper the desired output quality	To minimise odour and the corrosive nature of H_2S within the biogas throughout the AD process, ferrous dosing takes place. The daily quantities and dosing rates and associated data are recorded on SCADA and logged on the live Plant Monitoring Spreadsheet. The decision to dose with ferrous is dictated by the H_2S concentrations within the biogas.
c.	Optimising aerobic treatment	In the case of aerobic treatment of water-based liquid waste, it may include: • Use of pure oxygen • Removal of scum in tanks • Frequent maintenance of the aeration system In the case of the aerobic treatment of waste other than water-based liquid waste, see BAT 36.	Generally applicable	Liquid based feedstocks are accepted at Westwood, however, due to the nature of the anaerobic digestion process, no aerobic treatment of water-based liquid waste takes place on site.

BAT 14 – 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.

Technique		Description	Applicability	How Biogen complies
a.	Minimise the number of potential diffuse emission sources	This includes techniques such as: • Appropriate design of piping layout (e.g. minimising pipe run length, reducing the number of flanges and	Generally applicable	In order to minimise the number of potential diffuse emissions sources, the upgraded site layout has been designed and engineered with the intention of minimising pipe run lengths (where possible). Most

		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.		of the existing pipework is above ground stainless steel with welded fittings and pipes. Minimal piping is currently positioned below ground and under the ongoing modernisation of the plant as part of this variation, new and replacement pipework will continue to be above ground stainless steel and any pipework below ground is to be minimised further. Piping and Instrumentation Drawings (P&ID) are available for the site and amended according to any changes made. This includes both existing and upgraded plans for the site. The site is currently going through an extensive upgrade involving the phased replacement of process and storage vessels, and all associated infrastructure. The use of pumps are minimised wherever possible throughout Biogen's operations to minimise operational and maintenance costs. Once processed into the RWBT, digester material enters a sealed system of gas tight tanks and enclosed pipe work, the integrity of the pipe work and tanks on site is checked daily in accordance with the Daily Checks Procedure. Regular Non-Destructive Testing (NDT) to determine and monitor pipe thickness also takes place within designated areas in particular on pipe bends where the rate of thickness reduction is likely to be higher. This is conducted in accordance with a standard documented procedure and the results recorded. There is very low potential for odour from this part of the process.

				A strict documented Traffic Management Procedure for Westwood ensures site traffic is managed in a safe and controlled manner. All incoming vehicles carrying feedstocks are either sealed or covered accordingly. The nature of accepted feedstocks and the wet AD process ensures that dust is negligible on site. Pre-acceptance also considers dusty feedstock, if dusty feedstocks were to be accepted going forward, independent occupational and environmental dust monitoring would be commissioned as required, it is the responsibility of the Compliance Team to commission additional testing as required. A six monthly LDAR survey takes place including for PRV's with the use of Biogen's own highly sensitive gas leak detection camera.
b.	Selection and use of high integrity equipment	This includes techniques such as: • Valves with double packing seals or equally efficient equipment; • High integrity gaskets (such as spiral wound, ring joints) for critical applications • Pumps/compressors/agitators fitted with mechanical seals instead of packing; • Mechanically driven pumps/compressors/agitators;	Applicability maybe restricted in the case of existing plants due to operability requirements	The process tanks are gas tight vessels and therefore do not release to atmosphere. All the transfer pipe work is sealed and therefore there is no potential for odour release. Integrity of the process tanks will be inspected daily as part of the Daily Checks Procedure. Regular Non-Destructive Testing (NDT) to determine and monitor pipe and tank thickness takes place within designated areas in particular on pipe bends where the rate of thickness reduction is likely to be higher. This is conducted in accordance with a

		• Appropriate service hose access ports, piercing pliers, drill heads		standard documented procedure and the results recorded.
c.	Corrosion prevention	This includes techniques such as: • Appropriate selection of construction materials; • Lining or coating of equipment and painting of pipes with corrosion inhibitors.	Generally applicable	All pipework is stainless steel to minimise corrosion. To minimise the corrosive nature of H_2S through the AD process, ferrous dosing takes place. The daily quantities and dosing rates and associated data recorded on SCADA are logged on the live Plant Monitoring Spreadsheet. The decision to dose with ferrous is dictated by the H_2S concentrations within the biogas. Gas entering the Biogas Upgrade Plant (BUP) pending export to the national grid will be subject to further H_2S and ammonia removal, compression, condensate removal and CO_2 removal by being passed through a series of membranes which are impermeable to CO_2 and allow CH_4 to pass through with a minimum target CH_4 composition >97% to produce biomethane.
d.	Containment, collection and treatment of diffuse emissions	This includes techniques such as: • Storing, treating and handling waste and material that may generate diffuse emissions in enclosed buildings and/or enclosed equipment (e.g. Conveyor belts); • Maintaining the enclosed equipment or buildings under adequate pressure; • Collecting and directing the emissions to an appropriate abatement system via an air extraction system and/or air	The use of enclosed buildings or equipment maybe restricted by safety considerations such as the risk of explosion or oxygen depletion.	All feedstocks are received on site in an enclosed building operating under negative air extraction. The fast-acting roller shutter doors are fully closed prior to tipping and not reopened until the vehicle is ready to leave following tipping. The existing roller shutter doors will be subject to a full service as part of this permit variation. The new air extraction system is designed to achieve a minimum of three air changes per hour. This maintains a healthy working environment for staff and visitors and ensures odorous air is retained within the building to prevent fugitive emissions. The extraction fans are purpose designed and engineered to provide sufficient

		suction systems close to the emission sources.	The use of enclosed equipment or buildings may also be constrained by the volume of waste.	extraction in accordance with the design capacity of the building and the new carbon filtration system. Should the seal and integrity of the building ever be questioned, a physical or virtual smoke test could be repeated to demonstrate the integrity of the building and the minimum number of required air changes. The extracted air from the waste reception and processing building is directed to a carbon filtration system for treatment prior to treated air being released to atmosphere via a stack to aid with dispersion. The existing extraction and carbon filter system will be replaced with a new purpose designed and engineered extraction and carbon filter providing a minimum of three air changes per hour as part of this permit variation. Odourous air from the new purpose built digestate screening room is to be extracted through to a new acid scrubber for treatment. The screening room will be subject to a minimum of ten air changes per hour. The acid scrubber is predominantly targeted towards treating ammonia, hydrogen sulphide, VOCs and other liquid soluble compounds. This will significantly reduce ammonia and odour, as digestate screening currently takes place outside. No waste is stored outside.
e.	Dampening	Dampening potential sources of diffuse dust emissions (e.g. waste storage, traffic areas,	Generally applicable	The wet nature of feedstocks accepted on site and the wet nature of the process, ensures that dust is low risk in our process. Pre-acceptance also considers

		and open handling processes) with water or fog.		dusty feedstock, if dusty feedstocks were to be accepted going forward, independent occupational and environmental dust monitoring would be commissioned as required, it is the responsibility of the Compliance team to commission additional testing as required.
f.	Maintenance	This includes techniques such as: • Ensuring access to potentially leaking equipment • Regularly controlling protective equipment such as lamellar curtains, fast action doors	Generally applicable	A documented General Maintenance Procedure ensures that work is undertaken on site in a manner that does not compromise safety and adversely impact colleagues, and other persons. Potentially leaking equipment on site may include for example the separator and macerators. Documented maintenance procedures are in place for key plant and equipment including, but not limited to: • Pump operations and maintenance procedures • Separator operation procedure; and • Macerator maintenance procedure. A daily check is undertaken of the roller shutter doors and incorporated into the Daily Checks Procedure. A critical spare parts procedure is in place to enable essential key parts to be held in stock pending use. This enables other Biogen AD sites within a geographical area to share spare parts when required.
g.	Cleaning of waste treatment and storage areas	This includes techniques such as regularly cleaning the whole waste treatment area, conveyor belts, equipment and containers	Generally applicable	A jet washing procedure is incorporated into daily procedures at all Biogen AD sites in accordance with the Jet Wash Operations Procedure.

				Housekeeping operations form part of the Daily Checks Procedure and are essential to maintain a safe and clean working environment. Effective documented housekeeping also helps to minimise odour and pests.
h.	Leak Detection and Repair (LDAR) programme	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.	Generally applicable	Biogen operate to a very intensive maintenance regime to ensure the optimal performance of all their CHP engines. This is contracted to a specialist third party. This ensures the CHPs are maintained to their highest standard and will remain in place as part of this permit variation. The CHP engines are currently being removed from site on a phased approach and subject to decommissioning, full service and overhaul prior to recommissioning and return to site as part of this permit variation. The CHP running hours are recorded on SCADA and documented on a Plant Monitoring Spreadsheet. The engines are fitted with a 'Leanox System', which evaluates the gas quality and adjusts itself to ensure the most efficient burn of the gas and eliminating any methane slippage that could occur. By having this advanced technology on the CHP engines and also by maintaining to a high level, we believe we are operating to the current highest level of BAT. Annual CHP stack emissions testing takes place in accordance with the permit. The Daily Checks Procedure in place for the site includes weekly inspections including checks to all

				PRVs and also the remaining assets on site including pipework. In addition to the above, Biogen has invested in a gas leak detection camera to conduct six monthly LDAR surveys.

BAT 15 – 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.

Technique		Description	Applicability	How Biogen complies
a.	Correct plant design	This includes the provision of a gas recovery system with sufficient capacity and the use of high-integrity relief valves.	Generally applicable to new plants. A gas recovery system may be retrofitted in existing plants.	The existing auxiliary flare was utilised for 125 hours in 2025 which equates to 1.42% of the total available operational hours for the period. The flare was used for 152 hours in 2024 which equates to 2% of total operational hours. No emissions testing was required as flare use was comfortably within the permitted 10% allowance. The existing flare shall remain in operation to serve the CJP engines as part of this permit variation. The existing gas flare will be repositioned adjacent to the new flare to serve the Gas to Grid operations with a total to two flares operating independently. The sites gas flares will be maintained in accordance with the Emergency Flare Operating Manual. The flares are subject to a service at least every year by an independent specialist. Propane is initially used to establish a pilot flame. An adequate number of propane cylinders are stored on site at any one time. A propane cylinder auto switch will be installed to identify when the current cylinders in use are running low.

				Both gas flares will reach a minimum temperature of 1000°C to demonstrate complete combustion. Gas entering the Biogas Upgrade Plant (BUP) pending export to the national grid will be subject to further H_2S and ammonia removal, compression, condensate removal and CO_2 removal by being passed through a series of membranes which are impermeable to CO_2 and allow CH_4 to pass through with a minimum target CH_4 composition >97% to produce biomethane. CO_2 can be recovered for alternative use. Both auxiliary gas flares will be used during essential plant maintenance and/or in an emergency. CHP gas flow rates, gas to grid gas flow rate, flare flow rates and flare operating hours will be recorded on SCADA and on a Plant Monitoring Spreadsheet. Gas pressures are also recorded on SCADA.
b.	Plant management	This includes balancing the gas system and using advanced process control.	Generally applicable.	Both auxiliary gas flares will be utilised during essential plant maintenance and/or in an emergency. Flare flow meter readings are recorded daily, and flare run hours are recorded weekly on a live Plant Monitoring Spreadsheet. Back-up generators on site in the event of power failure. Both generators serving the CHP operations and the gas to grid operations will be tested monthly and recorded. The existing generator shall remain in operation to back up the CHP engines and a new generator will be installed on site to serve the gas to grid operations. All gas pressures are balanced within the system, and the flares auto ignite before the PRVs would release.

BAT 16 – In order to reduce emissions to air from flaring when flaring is unavoidable, BAT is to use both of the techniques given below.

Technique		Description	Applicability	How Biogen complies
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.	Generally applicable to new flares. In existing plants, applicability maybe restricted e.g. due to maintenance time availability.	The auxiliary flares will be used during essential plant maintenance and/or in an emergency. The sites gas flares are maintained in accordance with the Emergency Flare Operating Manual. The flares are subject to a service at least every 12 months by a third party. Propane is initially used to establish a pilot flame. Once the pilot is established the main burn will commence. Propane auto switches will be installed to indicate when a cylinder is running low. The gas flare reaches a minimum temperature of 1000^{o}C to demonstrate complete combustion.
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 flow gas rate, pollutant emissions (e.g. NOx, CO, hydrocarbons, noise). The recording of flaring events usually includes the duration and number of events	Generally applicable	All gas pressures are remain balanced within the system and the flares would auto ignite before the PRV's released. Flare flow meter readings and flare run hours will continue to be recorded on SCADA with readings recorded on a live Plant Monitoring Spreadsheet.

		and allows for the quantification of emissions and the potential prevention of future flaring events.		

BAT 18 – 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.

Technique		Description	Applicability	How Biogen complies
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 entrance or exits.	For existing plants, the relocation of equipment and building exits or entrances may be restricted by a lack of space or excessive cost.	The Westwood site is located in a rural setting. The nearest residential receptor is located approximately 600 metres from the site boundary. All existing processing equipment shall remain located within the sealed waste reception building with the shutter doors remaining closed when not in use. The site is also surrounded by an established vegetated clay lined earth embankment to minimise any visual impact which will also have noise attenuation properties. All front-end processing equipment and machinery is subject to ongoing documented maintenance to ensure it is operating effectively including with as low as possible noise generation. Both hammermills will be subject to full service and overhaul as part of this ppermit variation.
b.	Operational measures	This includes techniques such as: (i) Inspection and maintenance of equipment	Generally applicable	All critical control and processing equipment is subject to a routine inspection and maintenance programme which will continue as part of this permit variation. This includes daily checks for the depackaging plant and mobile plant for example. Site management maintain a Plant Equipment and Maintenance Checks Record to ensure all critical plant and

		(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		equipment is maintained in accordance with the manufacturer's recommendations. This includes minimising noise. The replacement of machinery and equipment with low noise substitutes will take precedence. Biogen has documented Contingency Arrangements for Equipment or System Failure to provide guidance on contingency measures in the event of system or equipment failure. This would include any plant or equipment malfunction which could generate excessive noise or vibration. All equipment and plant are operated and maintained by fully qualified, trained and experienced staff. All relevant employees need to demonstrate continued operational competence and receive periodic training. The roller shutter doors remain closed at all times except when in use for incoming / outgoing vehicle movements. The roller shutter doors are subject to routine documented inspections and servicing. There are no functional windows within the waste reception and processing building.
c.	Low noise equipment	This may include direct drive motors, compressors pumps and flares.	Generally applicable	All plant and equipment is maintained in accordance with the manufacturer's recommendations and is subject to a routine inspection and maintenance schedule. This includes maintenance and repair of all pumps, motors, compressors, gas to grid infrastructure and the gas flares in accordance with the Emergency Flare Operating Manual (see BAT 15 above).

d.	Noise and vibration control equipment	This includes techniques such as: (i) Noise reducers (ii) Acoustic and vibrational insulation of equipment (iii) Enclosure of noisy equipment (iv) Sound proofing of buildings	Applicability may be restricted by a lack of space (for existing plants)	Where necessary, all motors, pumps and compressors are acoustically enclosed to reduce noise. The reception hall and process building is constructed from a concrete lower base and upper metal cladding frame. This provides effective noise abatement together with plant and equipment maintained to a high standard and the site being located approximately 600 metres from the nearest residential receptor, means the likelihood of noise disturbance being substantiated off site is negligible. Therefore, additional sound proofing of the building isn't necessary at this time.
e.	Noise attenuation	Noise propagation can be reduced by inserting obstacles between emitters and receivers (e.g. protection walls, embankment sand buildings)	Applicable only to existing plants	The site is surrounded by an established vegetated perimeter clay lined earth bund which is likely to have noise attenuation properties. The RWBT, five Digesters, and Pasteurisers are contained in an existing area served by impermeable surfacing and a concrete bund. The remaining outer area including the three Digestate Storage Tanks are served by an existing engineered impermeable clay bund which is also likely to have noise attenuation properties.

<u>BAT 19</u> – Emissions to water

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.

Technique	Description	Applicability	How Biogen complies

a.	Water management	Water consumption is optimised by using measures which may include: • Water saving plans • Optimise the use of washing water • Reducing the use of water for vacuum generation	Generally applicable	Biogen's Environmental Policy is aimed at minimising resource use including water consumption as much as possible. This includes periodic reviews of water use and to identify further means of reducing consumption. Captured rainwater within the bund is to be stored in an above ground Water Tank (formerly FOG tank) contained within the impermeable concrete bunded area as part of this permit variation. This captured rainwater will either be put through the AD process for treatment or subject to treatment by adding an enzyme and/or aeration to reduce ammonia to 1ppm prior to being discharged to the onsite surface water attenuation pond. Any rainwater to be released into the pond, will be subject to visual assessment and ammonia testing by the site manager / duty manager. Mains water is used for hot washing to wash the plastic waste and rotor inside the mill. The volumes of water returned and recirculated back into the system are recorded on the Plant Monitoring Spreadsheet. Levels with the attenuation pond can be lowered by releasing water into the adjacent drainage ditch (soakaway) following a further inspection. The penstock valve remains shut at all times unless manually opened for release following further inspection and testing. The surface water attenuation pond level is visually checked as part of the daily checks' procedure. If the level in the pond is high and therefore requires a release through the drainage ditch system, a visual inspection of the water must be undertaken for signs of contamination, and a further ammonia testing kit must be used for testing. The

				attenuation pond is also equipped with an aerator to improve water quality and prevent stagnation. All testing of the pond water (including the ammonia level) and releases from the pond into the drainage ditch system must be recorded on a Plant Monitoring Spreadsheet. The volume of rainwater collected within the bund and put into the AD treatment process is recorded daily on the Plant Monitoring Spreadsheet together with mains potable use. Internal water distribution rates are also recorded on the Plant Monitoring Spreadsheet. Jet washers used on site currently rely on mains water supply. Jet washing is an essential part of maintaining good housekeeping and for ABP compliance. The viability of utilising harvested rainwater in jet washing activities and therefore reducing mains consumption is to be assessed. Jet washing water consumption is recorded as overall potable mains on the Plant Monitoring Spreadsheet. Weekly water readings are recorded and include a record of mains water which, together with harvested rainwater is used within the process. In 2025, a total of 10,425m^3 of water was put through the process of which 9411m^3 was mains water. In 2024, a total of 9,836m^3 was put into the process of which 6,613m^3 was mains water. An established Water Focus Group is in place to oversee water usage and to achieve a reduction in consumption.
b.	Water recirculation	Water streams are recirculated within the plant, if necessary after treatment.	Generally applicable	Condensate traps are used to collect condensate from the gas line outlets. Condensate sump water is returned back

				into the process for treatment. All condensate is managed in accordance with the Condensate Management Procedure.
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 is made impermeable to the liquids concerned.	Generally applicable	The waste reception and processing building is entirely sealed and undercover. All drainage including runoff is contained within the building's sealed drainage system with the drainage gradient engineered to flow to gully drains connected to the below ground pit. The reception hall floor is designed to drain away from the entrance doors. Concrete repair works within the building have been completed as part of permit variation. The five Digesters, Water Tank, two Pasteuriser tanks and the RWBT tank are contained in an area constructed from an impermeable ground bearing reinforced concrete slab and concrete bund. The greater remaining outer area including the three Digestate Storage Tanks are served by an existing engineered impermeable clay bund (see SLR Containment Review). Level detection probes installed within the bund sumps, reception hall and the current pump room are connected to SCADA. The bund is fitted with flood detection probes which are hard-wired to shut-off feed pumps and close applicable valves on activation. They are also linked to SCADA and integrated into the software controls. The release of surface water from the bund sump is undertaken by the site manager in accordance with the current Sump Inspection and Release Procedure. Water from the bund is pumped into the outside above ground Water Tank (formerly FOG tank). The water is then pumped to the front-end process line and put through the process if not

				discharged to the onsite surface water attenuation pond following treatment for ammonia reduction, if required. Rainwater collected in the surface water attenuation pond is not released into the drainage ditch until after a further inspection (subject to water level). The penstock valve remains closed at all times unless manually opened for release after inspection and testing. The surface water attenuation pond level is checked and for evidence of any contamination on a daily basis as part of the daily checks' procedure. If the level in the pond is high and therefore requires a release through to the drainage ditch, a visual inspection of the water must be undertaken for signs of contamination, and an additional ammonia test check must be completed. All testing of the pond water (including ammonia) and releases of the pond water must be recorded on the Plant Monitoring Spreadsheet.
d.	Techniques to reduce the likelihood and impact of overflows and failures from tanks and vessels	Depending on the risk posed by the liquids contained in tanks and vessels in terms of soil and/or water contamination, this includes techniques such as: • Overflow detectors • Overflow pipes that are directed to a contained drainage system	Generally applicable	All process tanks at Westwood are fitted with high-level detection probes continuously monitored and connected to SCADA. In addition to this they are hard-wired to automated valves and feed pumps. Pressure transducers automatically shut down all feeding into the digesters when activated. The high-level tank detection probes are subject to monthly testing.

		• Tanks for liquids that are located in a suitable secondary containment, the volume is normally sized to accommodate the loss of contained of the largest tank within the containment • isolation of tanks, vessels and secondary containment (e.g. closing of valves)		
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 runoff water	Applicability may be constrained when high volumes of waste are stored or treated.	All waste acceptance and pre-treatment is undertaken within the existing purpose-built enclosed building. All uncontaminated surface water captured within the fabric of the building is kept isolated and segregated from areas used for waste storage and treatment. The discharge of surface water from the bund is undertaken by the site manager in accordance with a documented procedure. All water from the bund is pumped into the above ground Water Tank (formerly FOG tank). The water is then subject to treatment (if required) and is discharged to the onsite surface water attenuation pond if not pumped to the front end for processing. Rainwater collected in the attenuation pond is not released into the drainage ditch until after inspection. The penstock valve remains shut at all times unless manually opened for release after further inspection and testing.

				The rainwater attenuation pond level should be checked together for signs of contamination daily as part of the daily checks' procedure. If the level in the pond is high and therefore requires release through to the drainage ditch, a visual inspection of the water must be undertaken for signs of contamination and an ammonia testing kit used.
f.	Segregation of water streams	Each water stream is collected and treated separately, based on the pollutant content and on the combination of treatment techniques. In particular, uncontaminated water streams are separated from wastewater streams that require treatment.	Generally applicable to new plants. Generally applicable to existing plants.	All waste acceptance and pre-treatment is to be undertaken within the existing purpose-built enclosed building. All uncontaminated surface water captured within the fabric of the building is kept isolated and segregated from areas used for waste storage and treatment. The discharge of surface water from the Water Tank within the bund is to be undertaken by the site manager in accordance with an established procedure. All captured water from the bund is either discharged to the onsite surface water attenuation pond or pumped through the process to the front end. Water within the attenuation pond is not released into the drainage ditch until after inspection. The penstock valve remains closed at all times unless manually opened for release after inspection and testing. The attenuation pond level is checked together for signs of contamination daily as part of the daily checks' procedure. If the level in the pond is high and therefore requires a release through to the drainage ditch to lower the pond level, a visual inspection of the water must be undertaken for signs of contamination and an ammonia testing kit must be used to test the water.

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.	Generally applicable to new plants. Generally applicable to existing plants.	All waste acceptance and pre-treatment will continue to take place within the existing purpose-built enclosed building. All uncontaminated surface water captured within the fabric of the building is kept isolated and segregated from areas used for waste storage and treatment.
h.	Design and maintenance provisions to allow detection and repair of leaks	Regular monitoring for potential leaks is risk-based, and, when necessary, equipment is repaired. The use of underground components is minimised.	The use of above ground components is generally applicable to new plants. It may be limited however by the risk of freezing. The installation of secondary containment may be limited in the case of existing plants.	All primary storage and processing tanks are subject to independent expert examination following a de-grit. The majority of the stainless-steel piping and instrumentation at Westwood is above ground and positioned within the containment area. Minimal below ground piping is positioned within the containment area. All new pipework as part of the sites modernisation under this permit variation will continue to bed stainless steel.
i.	Appropriate buffer storage capacity	Appropriate buffer storage capacity is provided for waste water generated other than normal operating conditions using a risk-based approach. The discharge of wastewater from this buffer storage is only possible after appropriate measures are taken (e.g. monitor, treat, reuse)	Generally applicable to new plants. For existing plants, applicability may be limited by space availability and by the layout of the water collection system.	The existing secondary containment area comprised of impermeable concrete surfacing and concrete bund serving all process tanks (RWBT, Digesters 1-5, Pasteurisers x2) together with the outer impermeable clay bund encompassing all tanks including the three Digestate Storage Tanks is designed and engineered to contain the volume of 25% of the total tanks' combined storage capacity (see SLR Containment Review). All waste acceptance and pre-treatment is undertaken within the existing purpose-built enclosed building. All

				uncontaminated surface water captured within the fabric of the building is kept isolated and segregated from areas used for waste storage and treatment.

BAT 21 – Emissions from accidents and incidents

In order to prevent or limit the environmental consequences of accidents or incidents, BAT is to use all of the techniques given below, as part of the Accident Management Plan.

Technique		Description	How Biogen complies
a.	Protection measures	These include measures such as: • protection of 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	An Environmental Accident Management Plan for Westwood addresses the environmental controls in place to minimise the risk of an incident occurring on site. It assesses the different areas of the site or activities with the potential to cause harm and the overall risk of this occurring after considering the environmental controls in place. The site perimeter will continue to be served by secure fencing and lockable gates with established hedgerows to prevent unauthorised entry with security doors and locks. A new CCTV system has been installed to provide full site coverage and is remotely accessible. The site is supervised during normal working hours and is checked visually at weekends and public holidays. A lock up procedure is in place to ensure the site remains secure at all times including a site perimeter walkaround ad updates to the wider business.
b.	Management of incidental/accidental emissions	Procedures are established and technical provisions are in place to manage (in terms of containment) emissions from accidents and incident such as emissions from spillages, firefighting water or safety valves.	An Environmental Accident Management Plan addresses the environmental controls in place to minimise the risk of an incident occurring from the following key areas: • Spillages from vehicles/mechanical failure. • Spillage from process and storage tanks

			• Odour from waste acceptance – waste reception building • Plant equipment failure resulting in leaks • Release of contaminated water from sump • Flooding of site • Methane/gas release • Unauthorised entry/arson and/or vandalism causing a pollution incident • Catastrophic failure of process tanks • Explosion of gas or failure of gas storage holder during unmanned hours • Incompatible substances / Unexpected reactions • Wrong connections made in drains or other connections • Failure of Mains Service • Operator Error
c.	Incident/accident registration and assessment system	This includes techniques such as: • 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.	All records of accidents, incidents, changes to procedures and the outcome of inspections are logged and tracked on an internal Integrated Management System (IMS) as an Improvement Log or Incident Log. All records are periodically reviewed by Biogen's Management Executive Team. Biogen are committed to continually reviewing operational practices and technologies as well as continually monitoring the environmental impact of its business activities. An internal review is conducted by the Management Executive Team immediately following an incident or accident. This includes a documented 'lessons learnt' procedure to prevent the reoccurrence of similar events. Any new procedures or changes to operations are implemented with immediate effect following review.

BAT 23

Energy efficiency

In order to use energy efficiently, BAT is to use both of the techniques given below.

Technique	Description	How Biogen complies
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 kW/h tonne of 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 streams treated etc.	Biogen are committed to energy efficiency as demonstrated in the company's environmental policy. This includes conducting periodic energy efficiency assessments across the business and are continuously looking at means of reducing energy consumption. This is predominantly aimed at increasing generation, reducing our environmental footprint and eliminating unnecessary costs. Three CHP engines will continue to utilised at Westwoods to generate electricity and heat as part of this permit variation. The three engines ran for a combined total of 25,581 hours (97.07% availability) in 2024. The surplus gas flare was utilised for 125 hours in 2025 which equates to 1.42% and 161 hours in 2024 which equates to 2% of the total available operational hours for the period, and within the 10% allowance. The site generated a total of 22,561 MWh of electricity in 2024. This is the total of all generation before the parasitic load has been removed. The plant exported 20,945 MWh with a parasitic load of 536 MWh used on site equating to 2.37% of total generation. Biogas usage was 11,490.82m^3. H_2S readings are taken each week to monitor biogas quality and recorded on a Plant Monitoring Spreadsheet. Also recorded on the spreadsheet are readings for CH_4, CO_2 and O_2. The gas to grid operations will generate biomethane to be injected into the national grid. Flare use is minimised as much as possible and only used during essential plant maintenance. Records of operating hours are submitted annually to the

		Environment Agency. This will include the new proposed auxiliary flare to serve the gas to grid operations. One of the benefits of having multiple CHPs allows Biogen to continue to generate electricity and heat whilst a CHP is offline for essential planned maintenance. This heat will continue to be utilised to provide heat to the Digesters serving the engines and the Pasteurisers. Two gas boilers will be utilised to heat the Digesters producing gas for the national grid. Heat from the CHPs will be used to heat Digesters 1 and 2 and both Pasteurisers. Gas from Digesters 1 and 2 will be utilised to fuel the 2 new gas boilers which will generate heat for Digesters 3, 4 and 5 for gas to grid generation. A Plant Monitoring Spreadsheet is used to record daily electricity export and import (kWh) readings, the amount of electricity consumed by the facility and the volume of gas injected to the grid. Also recorded on SCADA includes the CHP generation meter, parasitic meter (CHP electricity consumption), CHP operating (run) hours, SCADA generation and biomethane generation meter. Payments under the Renewable Heat Index (RHI) enables Biogen to receive payment for utilising their own generated heat to heat their premises. RHI meters are recorded daily on the Plant Monitoring Spreadsheet. Recorded RHI meters include for the digesters, pasteurisers, CHP's, and for Building Services. Approximately 33% of the heat generated by the CHP engines is reused back in the process to maintain the temperatures of the relevant Digesters and the pasteurisation vessels. Surplus heat from the Pasteurisers is also used to heat the digesters.
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:	As above, a Plant Monitoring Spreadsheet is used to record daily electricity exportation and importation (kWh) readings as well as the amount of electricity consumed by the facility and biomethane injection to the grid. Also recorded on SCADA includes the generation meter, parasitic meter (CHP electricity consumption), CHP operating (run) hours, biomethane generation and SCADA generation.

	(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 the energy is used throughout the process. 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.	Approximately 33% of the heat generated by the CHP engines is reused back in the process to maintain the temperatures of Digesters 1 and 2 and the pasteurisation units. Surplus heat from the pasteurisers is also used to heat the digesters. Gas from digesters 1 and 2 will be used as fuel for the new gas boilers to provide heat for digesters 3, 4 and 5 for gas to grid generation. The site generated a total of 22,561 MWh of electricity in 2024. This is the total of all generation before the parasitic load has been removed. The plant exported 20,945 MWh with a parasitic load of 536 MWh used on site equating to 2.37% of total generation.

BAT 24 – Reuse of packaging

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.

Description	Applicability	How Biogen complies…
Packaging (drums, containers, IBC's, pallets etc) is reused for containing waste, when it is in good condition and sufficiently clean, depending on compatibility check between the substances contained (in consecutive uses). If necessary, packaging is sent for appropriate treatment prior to	Some applicability restrictions derive from the risk of contamination of the waste posed by the reused packaging.	Biogen are committed to reducing waste packaging and to reuse packaging where possible as demonstrated in the company's environmental policy. This includes conducting periodic raw material and waste efficiency assessments across the business and are continuously looking at means of reducing waste including packaging. This is predominantly aimed at reducing our environmental footprint and eliminating unnecessary costs.

reuse (e.g. reconditioning, cleaning).		Ferrous will no longer be delivered to site in plastic IBC's. It will be either delivered by tanker to a purpose designed self-contained tank positioned within the secondary containment area or in solid form. Any containers for Trace Element Additive (TEA) dosing which cannot be returned to the manufacturer and/or supplier, are well rinsed out, labels removed and sent elsewhere for appropriate recovery or disposal. We no longer accept IBCs delivered on wooden pallets. All IBCs are delivered on reusable plastic or metal pallets. Incoming feedstocks are contaminated with non-compostable or digestible contaminants, in particular plastic and litter which should be no more than 5% w/w. This is predominantly removed during pre-treatment and temporarily stored pending removal from site for disposal to landfill. Biogen continue to actively source potential outlets for the removed contaminates, however due to the nature and variability of this waste steam, suitable recovery outlets are difficult to acquire.

BAT 33 – In order to reduce odour emissions and improve overall environmental performance, BAT is to select the waste input.

Description	How Biogen complies
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.	Biogen has an established Feedstock Pre-acceptance Procedure, which demonstrates how Biogen meets the BAT requirements and those in sections 2.1.2. of Sector Guidance Note IPPC S5.06. The pre-acceptance requires a three-stage sign-off by a representative from the Operations, Compliance and Laboratory/Research team. Samples are requested and analysed where appropriate on a risk basis. The procedure also details the need to obtain: • Information on the nature of the waste. • The composition and characterisation of the waste.

	• Handling requirements. • And associated hazards. • Where appropriate a representative sample of the waste will be taken from the customer and analysed ensuring the collected sample is representative providing justification for any deviations. The procedure is directly linked to the Feedstock Pre- Acceptance Form which is completed prior to any of the waste being accepted. The form, in addition to the above, also ensures the relevant information stated as part of the guidance is obtained: • Information and contact details for the current holder of the waste. • Description of the waste. • Description of the process giving rise to the waste. • Whether it is considered a high-risk feedstock, an example could be a liquid feedstock high in fat/oils or yeast which require careful management to preserve biology, or one where it is deemed a risk because of the nature in the way waste is collected. This requires additional sign-off at Director level. • The EWC/LOW code assigned to the waste. • The SIC code assigned to the producer of the waste. • The physical form the waste is in, e.g. solid, liquid, sludge. • Whether it contains Animal By-Products Regulations (ABPR) material, if yes, which category. • Whether it contains packaging, if yes, what type of packaging and estimated percentage. • The anticipated quantities of waste. • Waste testing (this is primarily for liquid-based feedstocks). Biogen undertake an extensive sampling program and work with an external laboratory to cover the following determinands: Total Solids % w/w, Organic Dry Matter % w/w, Total Nitrogen % w/w, Ammonium Nitrogen (mg/kg), Total Phosphorus (P) (mg/kg), Total Potassium (K) (mg/kg), Total Magnesium (Mg), Total Copper (Cu), Total Zinc (Zn), Total Sulphur (S), Total Molybdenum (Mo), Total Lead (Pb), Total Cadmium (Cd), Total Mercury (Hg), Total Nickel (Ni), Total Chromium (Cr), Total Sodium (Na), pH, Chloride, Fluoride, Total Arsenic (As), Total Selenium (Se), Water Soluble Sodium, CLS Fat Test (g / 100g), Microbial inhibition at pH 6.0, Microbial inhibition at pH 7.2, Microbial inhibition at pH 7.4, Microbial inhibition at pH 8.0, Biological Methane Production (LCH4/kg VS), Electricity Production (kWh/ AD tonne), COD (g/L). Routine samples are taken prior to acceptance and then either on a 6-monthly or 12-monthly basis, this is decided on a risk basis *(example of results for a customer*

	attached). In instances where there is cause of concern over variance, the research team will increase the frequency of testing for determinants of concern. Biogen have an agreed Feedstock Agreement; it stipulates that the customer must notify Biogen if there is a deviation from the feedstock described in their Agreement. This is a legally binding document that had input from legal advisors. It is signed by the customer. • Whether there are any special handling requirements with respect to H&S of personnel or in respect of the environment. Any hazards associated with the waste. • Haulier details, including Waste Carriers Licence, ABPR approval where applicable. • The type of vehicle the waste will be transported in. Biogen has a Delivery Offloading Procedure; this includes a requirement for the weighbridge operator to confirm the load with the driver at the point of weigh-in and prior to tipping. Here they will also check the EWC/LOW code, and the Waste Transfer Notes (WTN)/Duty of Care (DOC) paperwork and ensure they are booked in on the pre-agreed Commercial schedule. The initial sampling is undertaken prior to waste acceptance due to the turnaround times; however periodic sampling thereafter is coordinated by Biogen's Research Team. When waste is tipped the load is visually inspected for any non-conforming items, and material is again visually assessed for any obvious contamination prior to loading into the hoppers. In the event contamination is identified, it is quarantined to one side, and photographs are taken and the relevant persons notified as per the Contaminated Feedstock Procedure. The team are familiar with the waste acceptance criteria for the site and the need to report deviation from this. Likewise, the team will raise any other hazards resulting from waste streams that could impact on process safety, occupational safety or the environment. Biogen undertake frequent occupational and environmental monitoring, the frequency of which may be reviewed if necessary following feedback on feedstocks. Contamination tends to be objects which could cause mechanical damage to front end processing equipment as opposed to hazardous waste materials. However, to ensure this does not pose a risk, training is also provided to employees on hazardous waste, and this is also covered under the Disposal of Hazardous Waste Procedure. Biogen's Westwood's facility accepts source segregated food waste that was intended for consumption. To achieve the optimum biological conditions, Biogen agitate the contents of the Raw Waste Buffer Tank (RWBT) to ensure a homogenous mix. The waste pre-acceptance process would rule out any incoming

	material that couldn't be mixed at the waste acceptance stage or in the RWBT, or at the very least, would identify maximum volumes that could be accepted at any one time/over a period. Biogen have an established Research Team who form part of the pre-waste acceptance team and provide feedback and advice on new feedstocks and process monitoring. Segregation in the Westwood process therefore generally relates to the different stages of treatment where control measures are in place to ensure partially treated material cannot come into contact with fully treated material. This is controlled through engineering, including both software control and hardwired controls as part of our HAZOP process. To minimise the corrosive nature of H_2S through the AD process, ferrous dosing takes place. The daily quantities and dosing rates and associated data logged on SCADA are recorded on the Plant Monitoring Spreadsheet. The decision to dose with ferrous chloride is dictated by the H_2S concentration within the biogas which is tested multiple times per week. A new additional gas holder will feed the Biogas Upgrade Plant (BUP) where the gas will be subject to cooling where moisture and contaminations such as hydrogen sulphide and ammonia will be filtered and removed. Additional filtration then takes place through activated carbon to remove further hydrogen sulphide and Volatile Organic Compounds (VOCs). The next treatment stage is compression of the gas to the required pressure prior to entering the membrane system. The heat of drying the biogas, from the compressor, and from the cooling can be recovered. The remaining gases include methane (CH_4) and carbon dioxide (CO_2). The continued membrane phase involves the compressed gas passing through a multiple membrane system where the CO_2 and CH_4 are separated. The CO_2 can then be recovered and liquified. The separated biomethane (>97% methane) is then analysed and an odorant is added called tetrahydrothiophene (THT) (C_4H8S). In order to maintain essential nutrient balance for effective biological digestive health to achieve maximum biogas yields, a Trace Element Additive (TEA) is applied directly into the RWBT on a periodic basis. The concentration and composition of TEA applied is dependent on current feedstocks and plant biology. Samples are routinely taken from the RWBT and sent for analysis by our established Research Team who determine the level of dosing required. Any additional so-called TEA 'hits' required to improve plant biology are dictated by our Research Team. All weekly TEA additives including 'hits' are recorded on the live Plant Monitoring Spreadsheet.

	All attempts of reducing NH_3 levels are targeted at source as much as possible. This includes pre-acceptance checks and feedstock management. Air within the waste reception hall is extracted and channelled through to an existing carbon filter. A new purpose designed carbon filter will replace the existing carbon filter as part of this permit variation in accordance with BAT. Air from the new purpose-built sealed screening room is to be extracted through to a new acid scrubber prior for treatment. Screening of Digestate currently takes place outside with no extraction or odour abatement. The Odour Abatement Maintenance Procedure states the parameters routinely tested. The emissions from the carbon filter stack, and the acid scrubber outlet are subject to periodic emissions testing against specified ELV's in the permit and against BAT. This includes for NH_3, H_2S, odour concentration and an emissions removal efficiency test.

BAT 34 – In order to reduce channelled emissions to air of dust, organic compounds and odorous compounds, including H_2S and NH_3, BAT is to use one or a combination of the techniques given of adsorption, biofilter, fabric filter, thermal oxidation and wet scrubbing.

Table 6.7

BAT-associated emission levels (BAT-AELs) for channelled NH_3, odour, dust and TVOC emissions to air from the biological treatment of waste

Parameter	Unit	BAT-AEL (Average over the sampling period)	Waste treatment process
NH_3 (1) (2)	mg/Nm³	0,3-20	All biological treatments of waste
Odour concentration (1) (2)	ou_E/Nm³	200-1 000	
Dust	mg/Nm³	2-5	Mechanical biological treatment of waste
TVOC	mg/Nm³	5-40 (3)	

(1) Either the BAT-AEL for NH_3 or the BAT-AEL for the odour concentration applies.
(2) This BAT-AEL does not apply to the treatment of waste mainly composed of manure.
(3) The lower end of the range can be achieved by using thermal oxidation.

The odorous air from within the sealed waste reception hall is extracted and channelled through to a carbon filter (adsorption). The carbon filter stack for channelled emissions from the waste reception hall is a specified point source emission within the permit with emission parameters for H_2S, NH_3 and odour concentration. A new replacement carbon filter and emission stack will be installed as part of this permit variation which has been purposely designed and sized for the waste reception hall by an independent odour specialist. There are no maximum ELV's for H_2S or odour concentration. The ammonia maximum ELV is 20mg/m^3. The carbon filter is subject to six monthly testing (inlet and outlet).

The current listed cockle biofilter formerly treating odorous channelled air from the below ground sump in the reception hall is specified as a point source emission within the permit (A7), however this is no longer in operation and can be removed from the permit as part of this variation application.

A new acid scrubber is to treat extracted air from a newly constructed digestate screening room. The wet scrubber will be subject to six monthly emissions testing (inlet and outlet). Current screening of digestate takes place outside with no extraction or abatement. This will significantly reduce odour emissions from site.

No testing for dust or TVOC is conducted at Westwood as this is for Mechanical Biological Treatment (MBT) of waste operations only (see Table 6.7).

BAT 35 – In order to reduce the generation of wastewater and to reduce water usage, BAT is to use all of the techniques given below.

Technique		Description	Applicability	How Biogen complies
a.	Segregation of water streams	Leachate seeping from compost piles and windrows is segregated from surface runoff water (see BAT19f)	Generally applicable to new plants. Generally applicable to existing plants within the constraints associated with the layout of the water circuits.	Not applicable.
b.	Water recirculation	Recirculating process water streams (e.g. from dewatering of liquid digestate in anaerobic processes) or using as much as possible other water streams (e.g. water condensate, rinsing water, surface runoff 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)	Generally applicable	All captured rainwater from within the bund is to either be pumped to an above ground Water Tank (formerly FOG tank) for treatment prior to reduce ammonia prior to discharge to the onsite surface water attenuation pond following testing or put through the AD treatment process. Rainwater collected in the attenuation pond is not released into the drainage ditch until after further inspection. The valve remains closed at all times unless manually opened for release after inspection and testing. The attenuation pond level is checked daily and for signs of contamination as part of the Daily Checks' Procedure. If the level in the pond is high and therefore requires release through to the drainage ditch (reedbed) a visual inspection

				of the water must be undertaken for signs of contamination and an additional ammonia test. Treated rainwater may only be pumped to the attenuation pond if there is no visual signs of contamination and following an ammonia test of no greater than 1ppm. All bund water test results and of the attenuation pond water (including the ammonia concentration) and the volume of water discharged to the pond must be recorded on the Plant Monitoring Spreadsheet. The volume of rainwater collected within the bund and put into the AD treatment process is recorded daily on the Plant Monitoring Spreadsheet together with mains potable use, hot washing, attenuation pond volumes released and the volume of treated rainwater pumped to the pond. Internal water distribution rates are also recorded on the Plant Monitoring Spreadsheet. Condensate traps used to collect condensate from the gas line outlets is returned back into the process. All condensate is managed in accordance with the Condensate Management Procedure. All condensate is subject to full treatment and forms part of Biogen's end PAS 110 product.
c.	Minimisation of the generation of leachate	Optimising the moisture content of the waste in order to minimise the generation of leachate.	Generally applicable	Both solid and liquid based feedstocks are accepted at Westwood. To achieve the optimum biological conditions, Biogen agitate the contents of the Raw Waste Buffer Tank (RWBT) to ensure a homogenous mix. Biogen has an established Feedstock Pre-acceptance Procedure. Samples are requested and analysed where appropriate on a risk basis.

				The procedure also details the need to obtain: • Information on the nature of the waste. • The composition and characterisation of the waste. • Handling requirements and associated hazards. • Where appropriate, a representative sample of the waste will be taken from the customer and analysed ensuring the collected sample is representative providing justification for any deviations. The procedure is directly linked to the Feedstock Pre- Acceptance Form (attached) which is completed prior to any of the waste being accepted. The form, in addition to the above, also ensures the relevant information stated as part of the guidance is obtained including, but not limited to: • Information and contact details for the current holder of the waste. • Description of the waste. • Description of the process giving rise to the waste. • Whether it is considered a high-risk feedstock, an example could be a liquid feedstock high in fat/oils or yeast which require careful management to preserve biology, or one where it is deemed a risk because of the nature in the way waste is collected. This requires additional sign-off at Director level. • The EWC/LOW code assigned to the waste. • The SIC code assigned to the producer of the waste. • The physical form the waste is in, e.g. solid, liquid, sludge. • The anticipated quantities of waste. • Waste testing (this is primarily for liquid-based feedstocks). Biogen undertake an extensive sampling program and work with an external laboratory to cover the

				following determinands: Total Solids % w/w, Organic Dry Matter % w/w, Total Nitrogen % w/w, Ammonium Nitrogen (mg/kg), Total Phosphorus (P) (mg/kg), Total Potassium (K) (mg/kg), Total Magnesium (Mg), Total Copper (Cu), Total Zinc (Zn), Total Sulphur (S), Total Molybdenum (Mo), Total Lead (Pb), Total Cadmium (Cd), Total Mercury (Hg), Total Nickel (Ni), Total Chromium (Cr), Total Sodium (Na), pH, Chloride, Fluoride, Total Arsenic (As), Total Selenium (Se), Water Soluble Sodium, CLS Fat Test (g / 100g), Microbial inhibition at pH 6.0, Microbial inhibition at pH 7.2, Microbial inhibition at pH 7.4, Microbial inhibition at pH 8.0, Biological Methane Production (LCH4/kg VS), Electricity Production (kWh/ AD tonne), COD (g/L). Routine samples are taken prior to acceptance and then either on a 6-monthly or 12-monthly basis, this is decided on a risk basis *(example of results for a customer attached)*. In instances where there is cause of concern over variance, the research team will increase the frequency of testing for determinants of concern. Biogen have an agreed Feedstock Agreement; it stipulates that the customer must notify Biogen if there is a deviation from the feedstock described in their Agreement. This is a legally binding document that had input from legal advisors. It is signed by the customer. • Whether there are any special handling requirements with respect to H&S of personnel or in respect of the environment. • Any hazards associated with the waste. In respect of wastewater streams, the Westwood AD facility is designed with a sealed drainage system. All leachates from the incoming waste feedstocks are captured in a below ground pit which is then directed into the process for full treatment. The

				impermeable surfacing within the reception hall is engineered to drain towards the below ground sump and away from the doors. Repairs and improvements to the waste reception hall concrete floor have already been captured as part of this permit variation. Rainwater captured within the secondary containment area is either to be put through the AD process when necessary to offset mains water consumption, which therefore forms part of Biogen's PAS 110 digestate final product or discharged to the onsite surface water attenuation pond subject to testing. Total water to returned to process is recorded daily on the Plant Monitoring Spreadsheet. The volume of water discharged to the attenuation pond will also be recorded. Excess uncontaminated rainwater that cannot be held within the attenuation pond is allowed to flow through to the adjoining reedbed system and field drainage ditch by opening a manually controlled penstock valve. Biogen also recirculate from the RWBT and Digesters to the front end. Clean surface water from roofs, or from areas of the site that are not being used in connection with waste management activities can be discharged directly to the attenuation pond and/or to groundwater by seepage through the soil via soakaways.

BAT 38 – 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.

Description	How Biogen complies
Implementation of a manual and/or automatic monitoring system to:	SCADA (Supervisory Control & Data Acquisition) provides a continuous automated process monitoring system for tank levels, gas levels, gas pressures, tank temperatures and gas to grid upgrade plant which is remotely

• Ensure a stable digester operation • Minimise operational difficulties, such as foaming which may lead to odour emissions • Provide sufficient early warning of system failures which may lead to a loss of containment and explosions This includes monitoring and/or control of key waste and process parameters e.g.: • 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, concentration (e.g. H_2S) and pressure • liquid and foam levels in the digester	accessible by all relevant staff including site managers and operations managers. Any process monitoring parameters not monitored with the use of SCADA are also recorded daily on the live Plant Monitoring Spreadsheet. Westwood will operate with the use of a total digester storage capacity of 12,620m^3 comprised of 4,506m^3 (2 x 2280m^3 digesters) to serve the CHP engines and 8,060m^3 (2 x 2280m^3 and 1 x 3500m^3 digesters) for gas generation to the national grid. Digester temperatures are monitored with the use of fixed level temperature probes (recorded daily on the spreadsheet) which is calibrated by a weekly recorded handheld temperature reading. Digester feed flow rate (OLR) is recorded with the use of a fixed meter with a HRT of between 30 and 40 days. TEA dosing rates are recorded on the Plant Monitoring Spreadsheet. Digester tank levels are monitored continuously and recorded in percentage on the Plant Monitoring Spreadsheet. Digesters are equipped with high level detection probes. In addition to this they are hard-wired to automated valves and feed pumps. Pressure transducers automatically shut down feeding into the tanks when activated. This is also the case for flood probes positioned throughout the secondary containment area which shutdown all feeding when activated. High level probe tank and flood probe detection tests are conducted monthly. Samples are taken from the homogenous mix within the RWBT weekly prior to discharge to the digesters. Digester samples are taken three times a week. This includes pH and alkalinity testing. Daily feed rates are recorded into the RWBT and to the Digesters. The concentration of VFA's and ammonia within the digesters and digestate are recorded. H_2S concentrations within the biogas are tested and recorded weekly. CH_4, CO_2 and O_2 are also recorded. Ferrous dosing takes place to control H_2S concentrations, and application rates are recorded on the Plant Monitoring Spreadsheet. SCADA also records the CHP gas flow rate, the flare flow rates, the flare operating hours and the gas to grid flow rates. Gas pressures are monitored on SCADA.